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ABSTRACT

This issue of a research journal on gifted education examines a number of research projects that delve into questions of how family life affects intelligence, especially among gifted children. Specific articles include: (1) "Are We Raising Smarter Children Today?" (Wendy M. Williams), which discusses the effects of school-related factors on test scores and home-related factors affecting intelligence; (2) "Schooling, Intelligence, and Income" (Stephen J. Ceci and Wendy M. Williams), which examines the evidence for linkages among schooling, intelligence, and income and concludes that intelligence and schooling have a bi-directional relationship, with each variable influencing variations in the other; (3) "Preaching to the Choir: TV Advisory Usage among Parents of Gifted Children" (Robert Abelman and E. Jean Gubbins), which finds that parents of gifted children are more likely to utilize TV ratings information in the mediation of their children's viewing; (4) "Childhood Sibling Relationships of Eminent Canadian Women" (Carolyn R. Yewchuk and Grace A. Schlosser), which found that half of their subjects experienced close sibling relationships and often expressed their own responsibility as well as rivalry within the sibship; (5) "Birth-Order Effects in the Academically Talented" (Wayne D. Parker); and (6) "Families of Gifted Children in Taiwan" (Wen-Chuan Hsueh and Sidney Moon). (Chapters include references.) (CR)

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MENSA Research Journal 42

IQ — It's all in the family

Fall 1999

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* Awards for Excellence winner

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Editor's Preface

When you were growing up, did you fight with your sister? Did your mother tell you what to watch on TV and what you couldn't watch? Were you an only child? Did you have younger brothers or sisters? Did you come from a small family?

Well, maybe that's why you're so smart.

A great deal of research has been done on the nature/nurture debate, and we have come to many conclusions that point to the heritability of IQ. Yet we know that siblings, even twins, with the same genetic heritage and raised in the same home environment can end up as adults with widely differing IQs and levels of success in life. In this issue of the *Mensa Research Journal*, we examine a number of research projects that delve into questions of how family life affects IQ, especially among gifted children.

What happens to children as they grow up within their families has been a neglected area of research pertaining to giftedness. We are all used to seeing articles on how schools and teaching affect children, but the closest relationships, the most enduring behavorial patterns, and the earliest aspirations are formed within the family and most assuredly shaped by parents, siblings, and others within the household, as well as by family circumstances. Until now these crucial aspects of child development were not the focus of much attention in their effect on giftedness. I'm glad to see that we are at last learning more about them.

For those of us who have gifted children, these articles may bring some changes in how we view them and the rest of our families. For those of us who were gifted children, the articles may bring some recognition and recollection, stir some memories. Or, they may just be a good read!

Phyllis Miller, Editor

Are We Raising Smarter Children Today?
School- and Home-related Influences on IQ

Wendy M. Williams, Department of Human Development, Cornell University

> "I took a good deal o' pains with his eddication, sir; let him run in the streets when he was very young, and shift for hisself. It's the only way to make a boy sharp, sir." — Charles Dickens, *The Pickwick Papers*, 1836
>
> "If children grew up according to early indications, we should have nothing but geniuses." — Goethe
>
> "Too often we give children answers to remember rather than problems to solve." — Roger Lewin
>
> "When I was a kid my parents moved a lot . . . but I always found them." — Rodney Dangerfield.

How can we explain the worldwide increase in IQ test scores over the past 60 years, often called the "Flynn Effect"? Today's test-takers are scoring on average a whole standard deviation higher than in 1932 (see, e.g., Flynn, 1987, 1994). My discussion focuses primarily on two groups of causal influences that may have contributed to this effect: changes in schooling and changes in the home environment. I discuss changes that might reasonably be expected to have increased test scores, as well as those that may have decreased them. My perspective is that there is a rich tapestry of interwoven factors affecting test scores, some positive and others negative. The net result is the Flynn Effect.

At the outset, let us review the magnitude of the effect. Looking at intelligence test score changes over time, Flynn has found the following gains *per generation* of 30 years: 20 points for culturally reduced[1] visual tests of "fluid intelligence" like the Raven's Progressive Matrices, 10 points for fluid tests that are not culturally reduced (like verbal analogies or number series), 10 to 15 points for the Wechsler intelligence test in general, 9 points for the Wechsler verbal and other verbal tests of "crystallized intelligence," and very small gains for vocabulary subtests and academic achievement tests (also of crystallized

[1] The term "culturally reduced" refers to tests for which cultural differences in performance have been minimized. Such tests are designed to reduce the test-taker's need to rely on familiar cultural artifacts and references.

Reprinted from Ulric Neisser (Ed.), 1998. *The Rising Curve: Long-term Changes in IQ and Related Measures.* Washington, DC: American Psychological Association Books.

intelligence). The crystallized gains are quite substantial and look small only when compared to the fluid gains on the Raven Matrices.

The terms "fluid" and "crystallized" intelligence were originally coined to refer to on-the-spot reasoning and problem solving ability ("fluid") versus accumulated knowledge such as vocabulary and factual knowledge ("crystallized") (for a review see Horn, 1994). To measure *crystallized* intelligence, the test-taker is asked: "What is the boiling point of water?," "Who wrote Hamlet?," and "Why do we need license plates?" To measure *fluid* intelligence, the test-taker must detect regularities in patterns, rotate objects in space, reconstruct arrays, and complete matrices with missing parts. In a recent analysis, Flynn (1994) showed that a person born in 1877 who scored at what was then the 90th percentile on the Raven Matrices (the best measure of fluid-reasoning skills we have), would—with the same number of correct answers—score at the 5th percentile of the cohort born in 1967. These population increases in test scores are so enormous that it behooves everyone who uses test scores in research or in work with children or adults to think about what is causing them.

I. School-related Factors

School-related factors that may have influenced test scores include increases in school attendance, changes in children's visual world, declines in reading, changes in the content of instruction, declines in textbook level and instructional time, teaching to the test, and increases in educational spending.

Increases in Schooling and the Implications for IQ Test Performance

In the 1930s, mean educational attainment was 8-9 years, which meant that non-high-school graduates were taking IQ tests. In the 1990s mean educational attainment is 14 years (Bronfenbrenner et al., 1996). Today's test-takers, compared to those of a half century ago, have had much more overall exposure to school. What is the significance of this school exposure to IQ test performance?

It is clear that neither fluid nor crystallized intelligence, as measured by contemporary IQ tests, are pure measures of innate endowment. For one thing, both types of intelligence are influenced by schooling. It is perhaps not surprising that crystallized intelligence would increase with exposure to schooling, because school directly teaches the vocabulary and facts tapped by crystallized measures. But although psychologists have generally supposed that fluid measures wold be much less influenced be schooling, the data show that school experiences affect this type of performance as well (for a review of multiple studies see Ceci, 1991).

Cahan and Cohen (1989), for example, used cohort-sequential analysis to show that exposure to schooling increases both crystallized and fluid measures of intelligence. They looked at over 11,000 Israeli fourth, fifth, and sixth graders, comparing children who differed in age by only a couple of weeks, but

were in different grades because of the birthday cutoff for entering school in a given year. So, for instance, the study compared 10-year-olds with four versus five years of schooling. The effects of schooling were seen in both fluid and crystallized measures: For 9 of 12 tests administered, the effect of one year of schooling was larger than the effect of one year of age. Thus, in general, more school exposure results in higher IQ scores across the board.

Changes in Children's Games, Toys, and Visual World[2]

A possible contributor to gains in fluid intelligence is the diverse types of games and toys children grow up with today compared to 40 or 50 years ago: more computers, computer games, video games, and things that need to be assembled. Playing with these games and toys often requires mental manipulation and rotation, and the resulting new developmental experiences could shape visual/spatial abilities. Most children today have extensive experiences with these games and toys. Schools in general, and even economically disadvantaged schools, now have computers for student use. Computers provide children with exposure to graphic designs, rotational movement, and images that may help train fluid-reasoning skills. Raven Matrices resemble the displays used in certain computer games (and, for example, the "Wallpaper" screen-saver program), and children often play these games for hours.

Children today also encounter other forms of complexity while watching television that were unknown in the 1930s. Life as a whole is more complex for children today; they grow up inundated with stimuli from every corner. Many of these stimuli did not exist a half century ago (e.g., computers, computer games, sophisticated graphics and other types of images in movies and on television, and so on). This information-rich stimulation may affect children's information-processing rates and capabilities. Furthermore, the world of today's children is littered (literally and figuratively) with cereal boxes and placemats at children's restaurants covered with mazes, games, and "find the 25 hidden or embedded animals" activities; McDonald's Happy Meal bags with block-design problems; and similar packaging.[3] Many of these tasks are directly comparable to, and sometimes virtually identical to, questions on tests of fluid intelligence.

Declines in Reading

My research on why children don't read and how teachers and parents can encourage them to read (as well as numerous other studies) has showed that children spend between five and eight hours a day watching television and playing computer games on television screens and in video arcades (e.g., Bronfenbrenner et al., 1996; Elley, 1994). Most children read as little as possible—often

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[2] This topic relates both to children's school and home experiences. I discuss it here because the concept of children's changing visual world is important in understanding school-related influences on IQ.

[3] Although a few magazines, newspapers, and comic books from the 1930s contained examples of maze problems and embedded figures tasks, the exposure of the average child to such stimuli was extremely limited in the 1930s compare to the 1990s.

only five minutes a day (Williams et al., 1995; Williams, 1996). This means that today's children (compared to children in the past) have many fewer hours of exposure to the printed word, less familiarity with reading, and relatively more familiarity with geometric figures, patterns, and pictorial representations. Perhaps this lack of reading (and the associated decline in exposure to vocabulary words) has kept crystallized intelligence scores from increasing as much as fluid scores, while the increased exposure to pictures, figures, and shapes has contributed to fluid gains.

One test of this potential relationship would consist of comparing visual-spatial abilities (say, performance on Raven Matrices) for children living in rural versus urban areas of the United States (with appropriate controls and measures of the home environment). One might also compare rural children who have computers and computer games in the home with rural children who do not. Again my thesis is that we should think of the Flynn Effect as the net gain in a tapestry of differentially weighted factors.

The Matching of Instruction to the Demands of Different Types of IQ Tests

Broadly considered, trends in educational practice can either foster or inhibit the development of students' spatial abilities as measured on specific types of ability tests. In fact, the content of schooling has changed dramatically over the past half century. On the one hand, there is less emphasis on crystallized intelligence: Children today generally get less practice in and less real learning time for fact memorization. Students' actual academic learning time—defined as engaged time spent on meaningful tasks—has declined to 90 minutes per school day (Weinstein & Mignano, 1993). On the other hand, fluid thinking skills may be practiced more often today: A fourth grade class may spend the entire day making Native American dyes and food colorings and creating bold geometric patterns in cloth, instead of practicing the 3 Rs.

Most schools today allow children to work with math manipulatives—blocks, designs, and other three-dimensional representations—in place of more traditional paper-and-pencil math exercises. Thus, today's children spend more time on math activities than on traditional types of math instruction. This "activities" focus and trend, which began around the late 1960s, exists across the curriculum. This focus has switched the emphasis of instruction onto interactive, two-way, child-child and child-teacher school experiences, and away from rote solitary learning and memorization. So what, exactly, children learn is different today: Children today learn less declarative knowledge ("knowing that"), and more procedural knowledge ("knowing how") and strategies. Perhaps this increase in procedural knowledge and knowledge of strategies, coupled with the practice with activities and manipulatives, translates into gains on measures of fluid intelligence.[4]

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[4] In general, schools today spend more time on hands-on activities, and less time on traditional instruction. Rote, drill-based, and book-based solitary learning have been replaced throughout the American school system by activities-based, exploratory, discovery-learning approaches, as influenced by the work of Piaget (e.g., 1970; Ginsburg & Opper, 1980).

In addition, the emphasis on taxonomic, categorical reasoning, more often taught in the classrooms of the 1990s than the 1930s, may increase performance on those fluid analogy problems that employ well-known and shared crystallized knowledge, assumed to be constant across children. For example, "Apple and orange are alike because both are _____ [fruits]" is a question involving taxonomic reasoning that loads on fluid intelligence. Series problems like "2, 4, 6, 8, __, 12" also require the use of well-known, crystallized knowledge to reason in a fluid way. In sum, for fluid-intelligence tasks involving reconstructing patterns, rotating objects, solving mazes, and similar questions measuring abstract reasoning ability, children today may benefit from many types of contemporary school activities. However, for factual questions which tap crystallized intelligence, such as "What's the boiling point of water?," children of the 1930s may have had an advantage.

Declines in Textbook Level and Instructional Time

Other changes in school experiences are also important. Donald Hayes and his colleagues (1996) analyzed the complexity of words, sentences, and concepts appearing in different grades' textbooks throughout the century. They found that textbooks have been "dumbed down" two or more grade levels in the last 30 years. Dumbing down of texts means that children learn less factual information; this would tend to decrease crystallized intelligence. Perhaps the associated decline in actual instruction time (and, specifically, traditional instruction time) has left children with more time for activities that build fluid-reasoning skills, thus contributing to the Flynn rise.

School time spent on actual instruction has decreased sharply since the 1940s. The over 1000 hours per year of instruction mandated by most states often translates into only about 300 hours of quality academic learning time (defined as time spent engaged in meaningful and appropriate tasks) (Weinstein & Mignano, 1993). Three hundred hours divided by 187 school days equals about 90 minutes of actual quality learning time per day. Almost every study examining time and opportunity to learn has found that amount of content covered predicts amount learned (Berliner, 1988). Thus, learning of facts, information, and vocabulary has almost certainly decreased. This trend has probably exerted downward pressure on crystallized intelligence scores. The fact that crystallized scores have <u>not</u> declined suggests the existence of offsetting or compensatory activities and experiences that exert an upward pressure. These may include extracurricular activities, educational television, exposure to Happy Meal bags and cereal boxes with vocabulary words, and so on.

Teaching To The Test

A major focus of education since the 1960s and 1970s is referred to by teachers and administrators as "teaching to the test." Teachers are highly pressured by parents and administrators to keep students' test scores high

(Hanushek, 1994). Teacher's jobs, principals' raises, and even the value of real estate in school districts are affected by test scores (Woolfolk, 1995). Because tests are best at measuring knowledge of facts and basic skills, some teachers may focus on these facts and skills to the exclusion of other aspects of the curriculum. Many teachers also spend a great deal of time on direct training of test-taking skills. There is a general acknowldegement by teachers, administrators, and parents that teaching to the test has become more prevalent and emphasized due to our society's increased emphasis on test performance.

Smith (1991) found that preparing for, giving, and recovering from standardized tests took on average 100 hours of instructional time per year. One hundred hours is a significant proportion of the 1000 hours of mandated school time for most states, especially when we consider that students receive only about 300 hours of actual, direct instruction per year (Weinstein & Mignano, 1993). Thus, we might expect gains in both fluid and crystallized intelligence: Better test-taking skills in general would lead to overall higher scores, and drilling on facts and vocabulary would lead to increased crystallized scores.

Our society virtually guarantees that only those children who will do well on standardized tests have access to the best schools, programs, and resources. A child's future depends in large part upon her test performance today. So teachers spend significant classroom time teaching students how to do well on upcoming ability and achievement tests, which are given each year in many schools. When new curricula are announced, teachers immediately want to know if these curricula will help children score higher on tests. Parents and school administrators are also heavily invested in the test-score issue (Hanushek, 1994).

Much of this teaching to the test involves the direct teaching of strategies for guessing and test-taking (such as how to "outsmart" the test-developer and figure out the right answer). In addition, teachers sometimes drill students more on basic facts as a method of teaching to the test, but this takes far more time than basic strategy training. Almost all teachers stress how to score higher by being test-wise, and this strategy training would be likely to increase IQ scores across the board. Extra fact-teaching—if teachers choose to prepare children by stressing the learning of extra facts, vocabulary, and so on—should exert upward pressure on crystallized scores.

My research on practical intelligence for school, conducted with colleagues at Yale and Harvard Universities, resulted in a book writen to help teachers, adminstrators, and parents increase students' practical intelligence, so that these students could profit more from school (Williams et al., 1995). Although the book contains sections designed to help students read critically, write better prose, and do better on homework, what teachers and administrators focused on was the section called "Preparing for Tests." Students were highly motivated to absorb this part of the curriculum: They had been told since they were four years old that their test scores would either provide or deny them access to everything they wanted in life.

Our study of the importance of students' practical intelligence for school showed that students who learned these test-taking strategies did better as the year progressed on all types of tests, compared to matched control students in the same schools not exposed to training. The point is that test-taking skills can be trained and can increase students' scores measurably. The success of school-based and commercial programs to increase students' SAT, GRE, MCAT, GMAT, and LSAT scores provides additional testimony to just how open to training effects test performance is. Parents in New York City even train their 4-year-olds in how to do well on screening tests to gain admission to exclusive kindergartens (Gardner, 1996)!

Short high-school-based training programs result in average gains of 10 points in SAT verbal scores and 15 points in SAT math scores, while longer commercial programs show gains of 50 to as much as 200 points for some test-takers (Owen, 1985). In a meta-analysis of 40 studies of aptitude and achievement test training, Kulik, Kulik, and Bangert (1984) found that more substantial gains occurred when students practiced on a parallel form of the test for brief periods. Thus, how coaching programs are designed makes a difference in the score gains realized by students. Similarly, direct practice on IQ-test-like items (which is common in many schools) may have a significant effect on students' test performance.

Test-familiarity-oriented training and strategy training are both important to students' scores. Familiarity with the procedures of the test (which may lead to greater self-confidence and feelings of assurance), practice with answer sheets, and familiarity with specific question types all help students perform better (Anastasi, 1988). In addition, students are helped by instruction in general cognitive strategies such as general problem-solving skills—defining the question or problem correctly, knowing what's relevant to solving the problem and what's not, considering and analyzing alternative solution paths, choosing the best alternative, monitoring progress toward a solution, and checking work. Training in these skills helps students do better on many types of tasks (Anastasi, 1988; Williams et. al., 1995). As described above, the Flynn Effect is largest for tests such as the Raven Matrices which are thought to be "culturally reduced" and, consequently, unresponsive to test-wise training. However, Schliemann (1996) found that Brazilian children's performance on the Raven Matrices varied as a function of exposure to schooling. Thus, even performance on the Raven Matrices may be influenced by test-strategy training and exposure to test-taking. In general, there is substantial evidence that "test-wise" training increases test performance, and today's students are likely to receive more of this type of training than did the students of half a century ago.

Increases in Educational Spending

Additional significant changes in students' school experiences may have resulted from increases in educational spending. Has education been improving?

Are children learning more today in school? Much more money is spent on education today than in the past (Grissmer et al., 1994; Hanushek, 1986): Public spending on elementary and secondary education was $18 billion in 1960, $45.7 billion in 1970, $108.6 billion in 1980, and $132.9 billion in 1983. In real inflation-controlled dollars, this represents a 250% increase. However, expressed as a percentage of the Gross National Product, the increase is more modest: 3.6% in 1960 to 4.0% in 1983. In addition, the population was increasing in size, and expressing spending for education on a "per pupil" basis may be more appropriate. In 1960 spending was $1,711 per pupil; in 1990, spending was $4,775 per pupil (U.S. Bureau of the Census, 1992, p. 138). Consider a quote by Rothstein et al. (1995, p. 2): "With appropriate inflation adjustment, it appears that total real education spending per pupil increased by 61% from 1967 to 1991. Admittedly, this is a substantial increase, but it is much less than the 200% spending increase commonly assumed to have occurred."

However we examine the trend, its direction has clearly been up. But where has this money gone—on what, exactly, has it been spent? It turns out that much of this increase in expenditure has gone toward paying teachers' higher salaries (Grissmer et al., 1994; Hanushek, 1986). Also, *The Education for All Handicapped Children Act* (Public Law 94-142), Title I, and Title IX have all resulted in greater expenditures on previously inadequately served children, in order to provide all children with equal access to the educational system. Therefore, it is difficult to say if the quality of education for the average child has improved, or rather, if the nature of education and the populations served has simply changed. Still, it seems plausible that money spent on education might contribute to the Flynn Effect through many potential mechanisms. It is possible that these funds have enhanced the quality of education for all students, thereby improving intelligence test performance (for more detailed discussions, see Ceci et al.; Grissmer; Hauser, all in Ulric Neisser [Ed.] [1998], *The Rising Curve: Long-term Changes in IQ and Related Measures*).

II. Home-related Factors

Home-related factors that may have influenced test scores include the trend toward smaller families, greater educational attainment of parents, the trend toward urbanization, changes in parental style, changes in stress-levels upon pregnant women, and improvements in health and nutrition.

Trend Toward Smaller Families

Fewer children per family, which has been the trend for nonwelfare families, generally means more resources per child (Hernandez, 1998). Nonwelfare family income per child has increased over the timeframe of the Flynn Effect (Ceci, 1996; Grissmer et al., 1994). Real income hasn't grown, but dollars per child have. Clearly, more dollars per child can mean more resources per child, and the

potential IQ-enhancing value of a family's financial resources is obvious (e.g., providing computers, tutors, summer enrichment camps, and so on). Thus, increases in IQ may reflect more IQ-enhancing experiences that can be afforded by today's parents compared to parents during the Depression and Second World War, for example. (Flynn [1987] noted that with increased affluence comes an increase in IQ: He found an average 2.5 point IQ gain per 30-year generation due to a general increase in socioeconomic level.)

Greater Educational Attainment of Parents

As parents in successive cohorts become more educated, their children grow up in households that are more likely to stress education. More-educated parents are also able to teach their children the types of information relevant to IQ test performance. Thus, parents' education level in an important potential contributor to the Flynn Effect. In addition, even if the parents themselves are not well educated, research has demonstrated the significance of children interacting with one educated adult in their lives. One educated adult who can provide mentoring and role-modeling can help inner-city children escape the cycle of poverty (Blau, 1981). Blau found that African-American inner-city children with better outcomes have at least one adult with an educational orientation in their lives (this adult could be a parent, other relative, friend, etc.): Interacting with one person with an educational focus is essential to the child's outcome. Thus, the broad societal trends toward greater educational attainment (Ceci, 1991) affect not only the children of more educated people, but also other children with whom they come into contact.

What trends have characterized the education level of parents? Educational attainment of nonminority parents increased by 70%, and that of minority parents increased by 350% from 1973 to 1990 (Grissmer et al., 1994; Bronfenbrenner et al., 1996). Data from Hernandez (1995) indicate that in 1920, 18% of mothers and 16% of fathers had attained an educational level of four years of high school or more. In 1983, 81% of mothers and 86% of fathers had attained that level. The increase has been enormous by any standard. The trend basically hit asymptote (i.e., leveled off) around the early 1970s. These increases in the educational attainment of parents may have contributed to gains in children's IQ scores. Direct evidence for the effects of edcuational attainment on IQ test performance can be found in reviews by Ceci (1991), Ceci et al. (1998), and Ceci and Williams (1998).

Trend Toward Urbanization: The Decline of Rural, Agricultural Childhood

Over the past half century, the population of many countries has become increasingly urbanized. The rural agricultural lifestyle has declined (Hernandez, 1995); today's children are more likely than ever to grow up in urban and suburban communities. Part of the information-saturation that marks childhood today is associated with this move to the cities. Life in rural communities more often

connects day-to-day activities to basic survival (e.g., concerns about weather, maintenance of buildings, vehicles, and machinery, protection of water and food supplies, etc.). In urban and suburban areas (with the exception of high-crime city regions), the problems of living are of different types. While city dwellers may think about bus schedules, locations of businesses and stores, finding and keeping jobs, and avoiding troubled sections of town, rural dwellers may think about maintaining well-water quality during periods of drought, caring for livestock, and stocking sufficient food to make it through winter snowstorms.

Rural- and urban-dwellers all face the need to survive, but the problems they face require different types of thinking. The thinking associated with city life may more closely approximate the types of questions on many IQ tests. For example, rural children's knowledge of farm crop rotation and livestock maintenance is unlikely to be as relevant to IQ-test performance as is urban children's knowledge of complex bus schedules and current events. And it is not only the immersion in certain types of information that could affect IQ-test performance: Children growing up in rural communities often help around the farm from an early age and may have less spare time for playing computer games, watching television, mall hopping, and the like.

Ceci (1991) and Flynn (1987) have demonstrated that the IQs of urban children are higher than those of rural children. This difference may reflect the greater cognitive stimulation and test-relevant exposure children experience in urban environments. Regardless of the precise causes, the fact that more children now live in urban as opposed to rural areas than was the case a half century ago means that IQs would be expected to have increased due to this demographic transition. Flynn (1987) also showed mild increases in IQ due to the effects of urbanization in France around the period of World War II. In sum, it is possible that the population's move to the cities has contributed to the Flynn Effect.

Changes in Parental Style

Are today's parents raising their children differently from the parents of a half century ago? Could prevailing styles of parenting be contributing to the Flynn Effect? To answer this question, we must first consider the evidence regarding the effects of parental style upon children's IQ (for a review see Williams, 1994). Next we will consider the evidence that parental styles have changed. A caveat regarding the behavioral-genetic literature is also discussed. However, given the fact that environmental influences must be responsible for the Flynn Effect, this discussion emphasizes environmental as opposed to genetic factors and issues.

Parental style has been defined as "a constellation of attitudes toward the child that are communicated to the child and that, taken together, create an emotional climate in which the parent's behaviors are expressed" (Darling & Steinberg, 1993, p. 488). Baumrind (see, e.g., 1991) described parental behavior

as fitting within three general types or patterns: *authoritarian*, *permissive*, and *authoritative*.

Parents with an authoritarian style try to shape and control their children's behaviors, which they evaluate against a set of rigid standards. Authoritarian parents emphasize obedience, respect for authority, hard work, and traditional values, and discourage real communication in favor of the "listen and obey" mode. Baumrind (1971, 1973) saw authoritarian parents as being high in demandingness and low on responsiveness toward their children. The permissive parental style describes parents who give their children considerable freedom. Permissive parents have a tolerant and accepting attitude toward their children, rarely punish them, and make few demands and place few restrictions on them. The authoritative parental style refers to parents who set clear standards and expect their children to meet them, treat their children maturely, and use discipline where appropriate to ensure that rules are followed. These parents encourage their children to develop independence and individuality, and consequently practice open communication in which children's points of view and opinions are considered.

Baumrind's research explored the interrelationship of parental style and children's cognitive and social competence. She began by studying preschool children to learn what effects parental style had upon the children's intelligence and personality. Later, Baumrind and other researchers studied middle- and high-school-aged children, children of different races and ethnic groups, and children of different socioeconomic backgrounds. Representative studies are reviewed below to provide an overview of the evidence for the effects of parental style on children's cognitive competence.

Bee and her associates investigated the mother-child relationship as a predictor of later IQ and language development in the child (Bee et al., 1982). They found that infant physical status was a poor predictor of 4-year IQ or language, that child performance was a poor predictor before 24 months of age and good thereafter, and that family ecology predicted child IQ and language only within a low-education subsample, but not among mothers with more than high-school education. However, the quality of mother-infant interaction was one of the best predictors at every age tested, and was as good as actual child performance in predicting IQ and language development.

Estrada et al. (1987) found that the affective quality of the mother-child relationship when the child was 4 years old was associated with mental ability at age 4, IQ at age 6, and school achievement at age 12. The associations remained significant even after the effects of mother's IQ, socioeconomic status, and children's mental ability at age 4 were taken into account. The authors suggest that affective relationships influence cognitive involvement through the parent's willingess to help children solve problems, through the development of children's social competence, and through the encouragement of children's exploratory tendencies. Hess et al. (1984) found that maternal measures taken

during preschool years predicted school readiness at age 5 and achievement test performance at grade 6. But the prediction was stronger for age 5 than age 12, meaning that the mother's influence on school achievement was stronger during preschool years.

Dornbusch and his colleagues (Dornbusch et al., 1987) examined the relation of parenting style to adolescent school performance in a sample of 7836 high school students. The authors found that both authoritarian and permissive styles were associated with lower grades, while authoritative parenting was associated with higher grades. In a similar study investigating parenting practices and adolescent achievement in 6400 high school students, Steinberg and his colleagues focused on the impact of authoritative parenting, parental involvement in schooling, and parental encouragement to succeed on adolescent school achievement (Steinberg et al., 1992). The authors found that authoritative parenting led to better school performance and stronger school engagement. They also found that parental involvement with schooling was a positive force in adolescents' lives when the parents had an authoritative style, but less so when the parents had other styles.

The processes through which parental behavior affects a child's development were studies by Rogoff and Gardner (1984), who watched 32 middle-class mothers preparing their 6- to 9-year-old children for a memory test. The mothers guided the children in transferring relevant concepts from more familiar settings to the relatively novel laboratory task, thus assisting the children in mastering the task and in developing methods for completing similar future tasks. Formal attempts to measure the processes through which parental style influences child development in the context of more typical parent-child interactions have often focused on the home environment (e.g., Bradley & Caldwell, 1984). Researchers evaluate various features of parenting behavior in the home, such as maternal responsivity, maternal acceptance of the child, maternal involvement, language stimulation, and encouragement of social maturity, through the use of the HOME (Home Observation for Measurement of the Environment) Inventory.

In a study by Elardo, Bradley, and Caldwell (1977), various aspects of the early home environment were related to language development at age 3. These aspects were the emotional and verbal responsivity of the mother, the provision of appropriate play materials, and maternal involvement with the child. Bradley and Caldwell (1984) found that HOME scores from age 2 predicted intelligence test scores at ages 3 and 4 ½, as well as first-grade achievement test scores. Later, Bradley, Caldwell, and Rock (1988) examined children as infants and at age 10, finding significant correlations between home environments measured at both 2 and 10 years and children's achievement test scores and classroom behavior.

In sum, there is considerable evidence for a strong association between parental style and children's cognitive competence. The key word here is associ-

ation: Little evidence demonstrates clear cause-and-effect relationships between parental style and children's intelligence. Scarr (e.g., 1985, 1992) notes that mothers with higher IQs tend to have children with higher IQs, and that these mothers also tend to have more effective parental styles. Thus, the findings showing a link between parental style and children's cognitive competence are interpreted by Scarr as being due to the effect of shared genetically transmitted intelligence between mother and child. Scarr notes that parents' behaviors are correlated with their children's ultimately because of shared genes, and that what we observe in the world of parenting and child development is explicable even if parents have no effects on their children, or vice versa. (Not all developmentalists share this view; the inaugural 1993 issue of *Child Development* was devoted to opponents of this position.)

In addition to Scarr, researchers in behavioral genetics note that family influences on children's IQs decrease dramatically over development, resulting in a significant reduction in these environmental effects upon intelligence by adulthood (Plomin & Daniels, 1987). Studies of adoption show that parental style of adoptive parents has little or no effect on IQ (Scarr, 1997). Scarr concludes that, "Although estimates of shared nongenetic effects on individual differences in IQ from twin and adoption studies vary from 0% to 10%, one can say that they appear to be rather small in adult populations in Western societies . . . Socialization Theory, focused on parental rearing practices, which presumably vary mostly between families, accounts for no more than 10% of the variation in intelligence in these populations" (1997, pp 27-28). Of course, the behavioral genetic findings in general must still be reconciled with the fact that Flynn has shown in longitudinal analyses that the *same individuals* show increases over their own lifetimes when tested with the Raven Matrices, revealing convincingly that genetics cannot be directly responsible for these gains!

Is there any hard evidence for a *causal* relationship between parental style and children's IQ? Two studies are relevant, one experimental and one correlational. In 1978, Riksen-Walraven conducted a study of 100 Dutch mothers' interactions with 9-month-olds. This research looked at parental responsiveness to infants, and especially, at the role of parental stimulation of infants in the infants' development. Mothers were randomly assigned to four groups characterized by different types of interaction; the amounts of interaction were constant across the groups. These types of interaction differed in quality and timing.

One group of mothers was instructed not to direct the child's activities too much, but rather, to give the child the opportunity to find things out for herself or himself, to praise the child for these efforts, and to respond to the child's initiations of interactions. Basically, these mothers were taught to be responsive to their child (who was in control) and to support the child's initiatives, sort of like a mediated-learning-experience parenting style. Another group of mothers was told to speak often to their infants and to initiate interactions frequently; these mothers controlled the interactions instead of responding to the child. A third

group was instructed to do a mixture of what the first two groups were doing. A fourth, control group, was given no instructions.

Three months later the researcher observed and tested all infants. The mothers' behaviors differed significantly from group to group in accord with the instructions they had received. Infants of mothers who had been encouraged to be responsive showed higher levels of exploratory behavior than any other group and preferred novel to familiar objects. These babies also learned more quickly in a contingency task. Thus, infants randomly assigned to a condition of greater maternal responsiveness showed enhanced cognitive functioning. The conclusion is that *different styles of parenting* may *cause* differential cognitive development in children.

In correlational research supporting the same conclusion, Bettes (1988) investigated the effects of maternal depression upon mothers' speech to their infants, and ultimately upon the infants' cognitive and emotional development. The subjects were 36 mothers and their infants, aged 3 to 4 months. Ten of the mothers were rated as depressed. The mothers wore tape recorders to capture the vocalizations between the mothers and their infants. When the babies cooed, the nondepressed mothers were responsive and cooed back quickly. Depressed mothers, though, had a greater latency before responding to their babies; depressed mothers' vocal patterns were not tied to their children's vocal output. This latency meant that babies of depressed mothers had less predictability in controlling their environments. There was no difference in the vocalization patterns of infants of nondepressed versus depressed mothers at the start of the experiment (when the infants were 3-4 months old), but after 6 to 9 months, the children of depressed mothers had shut down linguistically.

Thus, Bettes showed in a mini-longitudinal study that caregiver behavior matters. Depressed mothers failed to modify their behavior according to the behavioral development of their infants; these mothers were slower to respond to vocalizations, and eventually their infants started to vocalize less than infants of nondepressed mothers. Bettes stated that her study provided evidence for how maternal depression increases the infant's risk for psychopathology. For our purposes, Bettes' study provides additional evidence that how parents interact with their children affects the children's cognitive development. The question we are left to consider, then, is whether styles of interacting with children have changed for parents over the last half century or so, the timeframe of the Flynn Effect.

Have parenting styles changed over the past 60 years? Research by Bronfenbrenner (1985) and Bronfenbrenner and Ceci (1994) has looked at changes over time in the nature and type of parental attention. In particular, the authors considered maternal responsiveness versus maternal directedness. They found that mothers' perceptions and ideas about how to mother, from the 1940s to the present, have changed for middle class mothers. "How-to-parent" books and magazine articles have proliferated, and simultaneously, the content of the advice given to parents has changed dramatically, with associated changes in

parents' beliefs and attitudes. The old emphasis stressed feeding on a strict schedule and using ample discipline. Since the 1940's, however, mothers have moved toward feeding on demand and responding to the child. Early in the century, lower-class parents were permissive and middle-class parents were rigid and controlling. Around the 1940s, this pattern shifted—lower-class parents became more rigid and authoritarian and middle-class parents became more permissive (Bronfenbrenner, 1985; Bronfenbrenner & Ceci, 1994).

The point is that parenting norms have changed; middle-class mothers have been reading how-to books, and have been influenced by these materials about recommended childrearing practices. Thus, we may conclude that maternal responsive behavior may be more common in the 1990s than in the 1930s, although during the last 20 years this trend may have reversed somewhat (Bronfenbrenner et al., 1996). There are fewer children per mother today, which allows for more responsiveness. It is possible that these changes in responsiveness have contributed to the Flynn Effect.

However, it is also true that today, more mothers work outside of the home. To the extent that a mother is not available to interact with her child, this might argue for the opposite direction of developmental effects if the quality of childcare is not high and is associated with lower responsiveness by care providers. The trend toward mothers working outside the home has existed since the Second World War: In 1949, 10% of mothers worked outside the home, compared to over 60% in 1994 (Bronfenbrenner et al., 1996). Once again, the picture is not straightforward when it comes to understanding the Flynn Effect.

Changes in Stress Levels Affecting Pregnant Women and Their Babies

Another factor that might contribute to the Flynn Effect is a change over the past half century in the level of stress upon pregnant women, and the effects of this stress upon the developing fetus. Huttunen and Niskanen (1978), two Scandinavian pediatricians and demographers, studied women whose husbands died either during pregnancy (n=168) or in the nine months following the birth of a child (n=167). The authors compared the outcomes for the children (born between 1925 and 1957) in these two groups to examine the effects of stress while the baby is in utero compared to the same stress once the baby is born. Babies whose fathers died when they were in utero were at an increased risk for later mental disorders and had an increased frequency of psychiatric disorders. But the effects were not mediated by birth complications—there were no more birth complications in the experimental than in the control group. It is reasonable to infer that the psychosocial risk factors that resulted in the decrements noted by Huttunen and Niskanen would be associated with cognitive decrements as well (Rutter, 1989).

Huttunen and Niskanen believe that the causes of the negative effects in the experimental group were related to the direct biological stresses upon the mothers while the babies were in utero (remember that all children grew up father-

less; the issue is simply whether the father died before or after birth). The causal mechanisms may involve hormones and stress on the part of the mother: Stress hormones may damage a child's system when in utero. The authors do note, however, that the emotional state of mothers widowed a few months earlier as opposed to later may have created a different bonding and early-life experience for the babies in the experimental as compared to the control group.

Are stresses greater or lesser on pregnant women today compared to a half century ago? In the 1930s, mothers contended with war, famine, disease, dangerous childbirth conditions and high childbirth risks, economic scarcity, poverty, and exhaustion due to caring for multiple children per mother. In the 1990s, mothers have better health care, access to food and good nutrition, a far easier time with childbirth due to medical advances, and fewer babies per mother.

But, today there are other types of stresses associated with modern life—for example, women often work at demanding careers and have short-term maternity leaves and "drive-through births," sometimes with hospital stays of only 24 hours. There are also the stresses of crime, violence, and urban decay for city-dwellers[5] (Bronfenbrenner et al., 1996).

Improvements in Health and Nutrition

Improvements in general health and nutrition of developing children and pregnant women must also be considered as potential contributors to the Flynn Effect (see Martorell, 1998; Sigman, 1998, for detailed discussions). It seems reasonable that health and nutrition might influence cognitive development and performance. However, there is confusion regarding the enduring cognitive effects of early malnutrition (Strupp & Levitsky, 1995; for a review see Ricciuti, 1993). Animals exposed to early malnutrition show lasting changes in emotionality, motivation, and anxiety. These factors affect all aspects of behavioral functioning, including cognition. Animals rehabilitated after the nutritional deprivation show lasting cognitive changes in cognitive flexibility and, possibly, susceptibility to proactive interference. But the effects of nutritional deprivation have not even been studied for many cognitive processes. Thus, the data are inconclusive.

On the one hand, Stein et al. (1972) found that nutritional deprivation did not

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[5] On this point more generally, it is worth noting that children born during periods of economic scarcity generally have lower IQs. The heritability of IQ goes down in periods of scarcity, due to ceiling effects (Bronfenbrenner & Ceci, 1994). In other words, children with the genetic capacity to score well can have their scores depressed because of poor developmental conditions. Ceci interprets data from Sundet et al.'s (1988) study of secular trends in the heritability of intelligence test scores in Norwegian twins, and states that these data reveal that coefficients of heritability of IQ tend to be lower during periods of war and economic depression. Thus, the performance of children on IQ tests is affected by prevailing economic conditions, and the poorer economic conditions at the beginning of the period under consideration (1930s) may contribute to the Flynn Effect. As economic conditions improved, we might expect IQ scores to have improves as well. As described above, Flynn (1987) found that one generation of affluence (improvement in socioeconomic level) led to a 2.5 point gain in IQ.

affect cognitive performance. The authors' study of the Nazi siege of the Netherlands looked at a severe wartime famine in the winter of 1944-45 which affected many pregnant women. Despite the severity of the famine, it yielded no cognitive effects when the mothers' children, now 19-year-old Dutch males, were tested before entry into the military. The 100,000 men born during the height of the famine at the end of World War II did not differ in IQ from men not exposed to famine while in utero.[6]

On the other hand, Donald Bundy (e.g., Bundy & Cooper, 1989; Nokes and Bundy, 1994), reporting on World Health Organization-sponsored studies on the role of parasite infection in cognitive performance, argues that giving infected schoolchildren one 15 cent pill improves school and test performance dramatically. Students who were repeating grades and achieving extremely poorly started being more alert and doing well. These studies also investigated the effects of micronutrient administration along with the anthelminthic drugs. The main finding is that children with parasite infections are lethargic and unable to concentrate, and do very poorly in school. Proper nutrients and better medical care can result in major improvements in these children's cognitive functioning.

The Child-to-Child Trust in London (Bailey, Hawes, & Bonati, 1994; Lansdown, 1995) has studied and disseminated literature on the topic of mothers' understanding of the role of good nutrition and good-health-focused habits in countries all over the world. The data show that when mothers understand the mechanisms of how to promote health, including how to get proper nutrition, children are more likely to attend school for more total years, perform better on tests, and succeed within the school environment. Thus, the mother-child relationship can potentially lead to increases in children's IQ scores if the mothers have more knowledge of health and nutrition, behave in accordance with this knowledge, and train their children in good health and nutrition habits. Children thus end up getting better health care and being better nourished.

Due to widespread health-education campaigns (Women, Infant, and Children [WIC] food programs, social-science-based food education programs, and so on), mothers' understanding of how to promote children's health has increased in the United States and other developed countries over the past 60 years. Nutrition (including micronutrient supplementation) and medical care (including immunizations) have improved. It is possible that these changes have contributed to the Flynn Effect.

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[6] Note that the Sundet et al. data just described looked at heritabilities, which are range dependent, inasmuch as they are based on intraclass correlations. The Stein data reflect absolute levels of performance [mean IQs]. Changes in means can proceed independently of changes in population variances; see Brofenbrenner & Ceci, 1994. In other words, it is theoretically possible for heritabilities to go down while in the same population mean IQ goes up, or vice versa. In practice, however, heritabilities tend to go down when IQs of people with the genetic capacity to score high are depressed, perhaps due to environmental assaults.

Conclusion

I have attempted in this chapter to scan the topography of world changes during the second half of this century, focusing on those that might be contributing to the Flynn Effect. My thesis is that a tapestry of forces can be identified, some of which exert upward pressure on test scores and some of which exert downward pressure. I have suggested some highly *probable* candidates that exert upward pressures on test scores (for example, increased educational attainment of parents, decreased family size and increased family resources, and increased school attainment of children), and also some *possible* candidates (for example, shifts in parental style). I have also presented a list of possible negative factors that might cause downward trends (e.g., less emphasis on fact learning in school). The logical next step would be to link each factor with specific changes in fluid and crystallized intelligence scores, and to examine these trajectories in various subgroups. Only by understanding how specific causal effects combine can we truly understand why IQ scores are escalating.

The Flynn Effect describes a general trend. But patterns in the Flynn-Effect data may help provide a more detailed picture pointing toward additional causal factors. For example, we should consider the specific types of items on IQ tests, and look at what types and even what specific items could have shown the largest changes over time. We should also look at what types of items have not shown substantial changes. If patterns of increases and decreases in IQ scores correlate with social or economic trends—such as relative rates of children living in poverty—we may gain additional insight into potential mechanisms. To understand developmental factors that affect scores over time, we must look not only at global population trends, but also at specific, local changes and correlates of overall patterns of changes in IQ test performance on types of items, specific items, and so on. We must consider societal trends, parenting trends, and schooling trends from decade to decade, and try to link these patterns of changes to patterns of changes in test scores. It seems wise to set our future sights on this agenda.

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Schooling, Intelligence, and Income

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In this article, the authors examined the evidence for linkages among three variables: schooling, intelligence, and income. They concluded that intelligence and schooling have a bidirectional relationship, with each variable influencing variations in the other. Moreover, changes in both schooling and intelligence influence variations in economic outcomes. Although any single study of the interdependency of these three variables can be criticized on the grounds that the data are correlational—and consequently are open to alternative interpretations—when viewed together, the evidence for their linked causality is quite convincing: Each increment in school attendance appears to convey significant increase not only in economic and social returns but also in psychometric intelligence. Thus the value of schooling appears to extend beyond simply schooling's direct effect on income.

The word is out: The benefits of staying in school are pervasive. School attendance is associated with lower rates of teen pregnancy, welfare dependency, and criminality proneness, to name only a few of the myriad advantages of staying in school (Bronfenbrenner, McClelland, Wethington, Moen, & Ceci, 1996). High school graduates will earn $212,000 more than nongraduates over their lifetimes, and each additional year of school attainment is associated with increasing income. For example, college graduates will earn $812,000 more than high school dropouts, and graduate students with professional degrees will earn nearly $1,600,000 more than college graduates (Bronfenbrenner et al., 1996).

These economic benefits of school attendance are clear and unambiguous. What is less clear, however, it the reason for them. Why, exactly, does schooling increase income? To some, staying in school is related to later earnings because it is primarily a marker for intelligence. According to this view, the reason more schooling leads to higher income is primarily because people who complete more schooling were more intelligent before they even entered school and because intelligence both directly and indirectly conveys tangible economic benefits. It is well documented that those who drop out of high school tend to score lower on intelligence tests than do those who graduate, and it is also known that they earn less income (Bronfenbrenner et al., 1996). Because of these facts, the correlation between school attendance and earnings could be due to a combination of two effects: (a) the indirect effect that intelligence exerts on economic outcomes (because intelligent workers are rewarded for the skills they display in training and in doing their jobs) and (b) the direct effect that schooling has as a result of minimum entry-level educational standards required for getting certain jobs (e.g., Scarr, 1992).

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Although all serious scholars agree that no single factor accounts for the entire advantage that schooling contributes to economic success, several researchers have suggested that the indirect route through which general intelligence mediates school performance, and consequently employment success, is prepotent (see e.g., Gottfredson,1998; Rushton, 1997). When intelligence is statistically controlled, very little of the variance in job success is accounted for by schooling: "Average validity coefficients for educational level (0.0 to 0.2) are inconsequential relative to those for general intelligence" (Gottfredson, 1998; also see F. Schmidt, 1996).

Recently, in *The Wall Street Journal*, there was a heated exchange of letters and editorials regarding a new personnel test for the selection of police officers. F. Schmidt (1996) argued that general intelligence reigns supreme in accounting for occupational success in a wide range of settings, even among applicants possessing a minimum of two years of college: "Eighty years of research shows that general intelligence is the best predictor of both performance in training and performance later on the job" (p. A23). And in perhaps the best documented validity study to date, Hunter (1983) reported that differences in intelligence accounted for 29% of the variance in job-performance ratings when the ratings were corrected for unreliability. Thus, intelligence was far more powerful as a predictor of job success than any other variable Hunter considered.

The high predictive validity of intelligence for job success suggests that the association between schooling and job success may be due to the mediating role that intelligence plays in schooling, with more intelligent students being reinforced for staying in school longer. This account is consistent with the high correlations generally found between measures of intelligence and the amount of schooling one receives—.60 for white males in the data set used by Herrnstein and Murray (1994), .55 in a recent report by a task force established by the American Psychological Association (Neisser et al., 1996), and between .50 and .90 in Ceci's (1991) review of 16 studies.

Thus, the high correlation between general intelligence and years of schooling is consistent with the position some have taken that achievement in school is driven by native intelligence rather than by background variables that are external to the organism:

> Being poor has a small effect on dropping out (of high school) independent of IQ . . . [and] youngsters from poor backgrounds with high IQs are likely to get through college these days, but those with low IQs even if they come from well-to-do backgrounds are not. (Herrnstein & Murray, 1994, p. 143)

The high correlation between general intelligence and years of schooling also implies that if higher IQ students did not attend school, they would, on average, nevertheless earn more than their lower IQ peers—even if the latter stayed in school longer. Put simply, this view says it is intelligence that is mainly responsible for students staying in school and for people achieving higher earnings, a position in accord with Herrnstein and Murray's analysis of the drastic reduction

in predicting poverty that resulted when they controlled for general intelligence—by as much as 80% (p. 334). Thus, the fact that years of schooling and IQ are correlated is seen by proponents of this view as evidence that teachers and parents recognize and reward students who possess high IQs. This attention to high-IQ students reinforces students' decisions to remain in school, where they may acquire more job-related skills and better entry-level credentials. Also, because they are more intelligent, they often will do better in future jobs than will their less intelligent peers.[1]

Although the majority of serious scholars in the field of intelligence realize that intelligence does influence the decision to stay in school, some may not realize that staying in school can itself elevate one's IQ—or, more accurately, prevent it from slipping. For example, elsewhere Ceci has shown that each additional month a student remains in school may increase the student's IQ score above what would be expected if the student had dropped out (see Ceci, 1991 for a review of the historical literature). The proposition that schooling increases IQ—instead of simply IQ influencing the decision to remain in school—is surprising to anyone who views IQ as measure of innate intelligence, associated with brain size and various other neurobiological indicators (see Rushton, 1997, for evidence that IQ is related to brain size, the latter being related to occupational status as well).

Some theories do postulate the enhancement of intelligence as a function of schooling, most notably Cattell's Gf-Gc (see Horn, 1994), but for reasons we desribe later, such theories are unable to explain the data we describe here.

There are at least seven types of evidence for the proposition that staying in school elevates IQ. We review these seven types of evidence, drawing support from classic studies from the earlier half of this century. In our review, we focus on the path that leads from school attendance to increases in intelligence test scores, not because we believe that this is the sole causal route to economic success but rather because until recently there existed a cadre of resarchers who doubted that this route played any important role at all (Ceci, 1991). Following this brief historical review, we attempt to link changes in both schooling and intelligence test scores to changes in economic outcomes by clarifying the interdependent nature of schooling and IQ.

Seven Types of Historical Evidence for the Effect of Schooling on IQ

How exactly does staying in school elevate IQ? Let us consider the seven types of evidence we have uncovered in our excavation of some older studies that are often overlooked by modern researchers.

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[1] Obviously, there are some jobs for which school learning is important (e.g., no one wants to be operated on by someone who has not attended medical school, regardless of how high the person's IQ is). In contrast, many jobs require high school and college diplomas that do not guarantee actual job-relevant knowledge; rather, such diplomas reflect discipline, stick-to-itiveness, and sundry other forms of motivation. At the statistical (aggregate) level, the claim is that intelligence is associated with gains in earnings, net any and all such contributions due to schooling.

First Type of Evidence: The Effect of Intermittent School Attendance

The earliest example of the influence of schooling on IQ scores was reported by Freeman (1934). At the turn of the century, the London Board of Education commisioned Hugh Gordon to study a group of children who had very low IQs. Some of these children were found in London classrooms, whereas others attended school only intermittently—either because of their physical disabilities or because of their status as sons and daughters of gypsies, canal-boat parents, and so forth. In Freeman's own words,

> Further analysis revealed the impressive and startling fact that the intelligence quotients of children with the same family decreased from the youngest to the oldest, the rank correlation between the intelligence quotients and chronological age being -.75. Not only that, but the youngest group (4 to 6 years of age) had an average IQ of 90, whereas the oldest children (12 to 22) had an average IQ of only 60, a distinctly subnormal level. . . . The marked and steady decrease in intelligence with increasing age suggests that factors other than heredity are at work . . . . The younger children appear to be about "normal" in intelligence, because success in the tests of the earlier years does not depend upon the opportunity for mental stimulus and exercise such as is offered by the school . . . . The results of the investigation suggest that without the opportunity for mental activity of the kind provided by the school—though not restricted to it—intellectual development will be seriously limited or aborted. (p. 115)

Freeman's (1934) conclusion was bolstered by data from the children of gypsies, who also attended school intermittently. There was a high negative correlation between IQ and chronological age, as was the case for physically handicapped youngsters. Note that this is in the opposite direction of the often-reported fact that first-born children possess higher IQs than their younger siblings (Zajonc & Bargh, 1980). Thus, the longer youngsters stayed out of school, the lower were their IQs.

The next study of the influence of intermittent schooling on IQ was carried out in 1932 by Sherman and Key. They studied children reared 100 miles west of Washington, DC, in "hollows" that rimmed the Blue Ridge Mountains. Some of the hollows were more remote than others. The ancestors of these "hollow children" were Scottish-Irish and English immigrants who retreated into remote regions of the mountains when their land was deeded to German immigrants in the 19th century. They remained in these hollows for several generations.

Sherman and Key (1932) assumed that the original genetic pool of the people in the different hollows was very similar. They selected four of the hollows for study on the basis of their differing levels of isolation from modern communities. They also studied a fifth hollow, Briarsville, that had been settled by the same Scottish-Irish stock as the others but that was situated at the foot of the mountains rather than in an isolated area and had schools in session nine months of the year. Thus, Briarsville represented a sort of baseline against which the effects of isolation associated with the more remote hollows could be evaluated.

Colvin, the most remotely situated of the hollows, had no movies or newspapers and virtually no access roads to the outside world. There was a single school, but it was in session intermittently, a total of only 16 months out of 127 months between 1918 and 1930. Only three of Colvin's adults were literate, and physical contact with the outide world appears to have been nonexistent. The other three hollows were progressively more modern. They had varying levels of contact with the outside world (Sherman & Key, 1932).

Sherman and Key (1932) observed that the IQ scores of the hollow children fluctuated systematically with the level of schooling available in their hollows. Advantages of 10-30 points were found for the children who received the most schooling. Also, there was a dramatic age-related trend in IQ levels: the older the child, the lower was his or her IQ. Six-year-olds' IQ scores were not much below national average, but by age 14, the children's IQs had plummeted into the mentally retarded range. In a later study, Tyler (1965) reached a similar conclusion. She reported that the IQs of children born in 1940 in a mountainous area of Tennessee were, on average, 11 points higher than the IQs of their siblings born in 1930. She rejected a genetic explanation for this improvement in favor of one that emphasized the increased educational and economic opportunities that developed during the decade in question.

Similar "cumulative deficits" in IQ with age have been reported among African Americans and British working-class youths (Jensen, 1980; Vernon, 1969; Wiseman, 1966). Also, Douglas (1964) showed that the average difference between the IQs of differing social classes became larger with age. All of these studies share a focus on the systematic changes in IQ scores with the amount of schooling that a child receives. All show that the average child started out with an IQ in the average range but became progressively lower in IQ as a function of the cumulative effects of intermittent schooling. Thus, studies of intermittent schooling provide evidence for a causal link between schooling and IQ.

Second Type of Evidence: The Effects of Delayed School Start-Up

In an investigation carried out in South Africa, Ramphal (as cited in Vernon, 1969) studied the intellectual functioning of children of Indian ancestry whose schooling was delayed for up to four years because of the unavailability of teachers in their village. Compared with children from nearby villages inhabited by Indian settlers of similar genetic stock who were fortunate enough to have teachers, children whose schooling was delayed experienced a decrement of five IQ points for every year that their schooling was delayed.

Other studies also have documented the deficit in IQ scores that accompanies delayed school start-up. For example, in The Netherlands during World War II, many schools were closed as a result of the Nazi occupation, and many children entered school several years late. These children's IQs dropped approximately seven points, probably as a result of their delayed entry into school (DeGroot, 1951). Fortunately, much of this decrement was ultimately recovered by those who remained in school.

A half decade later, W. H. O. Schmidt (1967) reported results similar to those of Ramphal (as cited in Vernon, 1969) in his analysis of a different South African community of East Indian settlers. W. H. O. Schmidt measured the impact of schooling on both IQ and achievement, holding constant age, socioeconomic status (SES), and parental motivation. With age held constant and SES and motivation partialed out, the correlation between the number of years of school attended and IQ was .49 for a measure of nonverbal intelligence and .68 for a measure of verbal intelligence. In addition, W. H. O. Schmidt reported a correlation of .51 between schooling and scores on the Raven's Progressive Matrices. (Raven's Progressive Matrices are considered to be an excellent measure of general intelligence, or *g*.)

W. H. O. Schmidt (1967) also found that even after children had been in school for several years, those who began school late had substantially lower IQs than those who began school early—another instance of a cumulative deficit. Finally, W. H. O. Schmidt reported that the correlation between the number of year of schooling completed and achievement test scores (vocabulary and arithmetic) was no higher than that observed between schooling and IQ. This equality of correlations seems to suggest that IQ scores are just as influenced by schooling as is something that is assumed to be explicitly taught in school, namely, academic achievement (Howe, 1972). These results, viewed together with others that we mention shortly, strongly suggest that schooling exerts a substantial effect on IQ that is independent of parental motivation or SES (see also Kemp, 1955; Wiseman, 1966). Moreover, none of the findings support the proposition that the IQ-schooling relationship can be attributed to intelligent children beginning school earlier or staying in school longer or to any form of increased outbreeding. Thus, studies of the effects of delayed school start-up also suggest a causal relationship between schooling and IQ.

Third Type of Evidence: The Effect of Remaining in School Longer

There is no a priori reason for thinking that people born on a given day of the year are smarter than people born on any other day. What systematic variable could be responsible for men born on, say, July 9, 1951, being more intelligent than men born on, say, July 7, 1951? No ready explanation comes to mind. Consider, though, that toward the end of the Vietnam War, a draft priority score was established by lottery. For a given birth cohort, each day of the year was assigned a number from 1 to 365. If a man's number was low, his chance of being drafted was heightened if he did not have a student deferment or a medical exemption. For those with very low numbers, staying in school was a sure way to avoid being drafted. It is well established that men born on July 9, 1951 stayed in school longer, on average, than their peers born on July 7, 1951. July 9th happened to be the Number 1 draft date for men born in 1951, whereas July 7th happened to be the Number 365 draft date.

As a result of extra schooling to avoid military service, men born on July 9th earned approximately a 7% rate of return on their extra years of schooling

(Angrist & Krueger, 1991). This figure of 7% was very close to the estimate of the return on an extra year of schooling derived from studies of being born early or late in a given year (see Neal & Johnson, as cited in Heckman, 1995). Because of the nature of such experiments, it is possible to be fairly confident that the wage-schooling gap was not due to differences in native intelligence between men born on these two days. Instead, the differences in the amount of schooling of men with comparable intellectual potential led to significant differences in economic outcome. Thus, studies of the effects of remaining in school on subsequent earnings, although not demonstrating a direct causal effect of schooling on IQ, do imply such a link, because IQ, which is associated with variance in earnings, was presumably the same for both groups prior to their divergence in schooling. Of course, this is surmise: the relevant IQ data to test this hypothesis are nonexistent.

Fourth Type of Evidence: The Effect of Discontinued Schooling

Researchers have demonstrated the detrimental effect of dropping out of school before graduating (DeGroot, 1951; Husen, 1951; Lorge, 1945). In Harnqvist's (1968) study of Swedish male adolescents, he selected a 10% random sample of the Swedish school population born in 1948 who at the age of 13 were given IQ tests. When they reached the age of 18 (in 1966), 4,616 of these Swedish men were retested as part of their country's national military registration. Thus, this study was not vulnerable to the usual sampling criticisms.

Harnqvist (1968) compared adolescents who were similar on IQ, SES, and school grades at age 13 and determined the impact of dropping out of school. He found that for each year of high school (gymnasium) not completed, there was a loss of 1.8 IQ points, up to a maximum difference of nearly 8 IQ points between two adolescents who were similar in IQ, SES, and grades at age 13 but who subsequently differed in the amount of schooling completed by up to four years of high school. (Similar findings were reported by both DeGroot [1951] and Husen [1951], using different samples and analytical procedures. In Husen's study, a comparison of 613 Swedish boys who had been tested in the third grade in 1938 and again at the time of military registration in 1948 indicated that completing junior high school was associated with a 3-point advantage whereas completing secondary school yielded an 8-point advantage.) Thus, studying the effects of discontinued schooling also provides evidence for the effect of schooling on IQ.

Fifth Type of Evidence: The Effect of Summer Vacations

A special case of the disadvantages of early school leaving can be seen in the lives of every American child during summer vacation. Two independent studies have documented, with large samples, the systematic declines in scores that occur during the summer months (Hayes & Grether, 1982; Heyns, 1978). These declines are not large, but they are undeniable: With each passing month away from school, children lose ground from their end-of-year scores on both intellectual and academic tests. The declines are especially pronounced for those chil-

dren whose summers are least academically oriented. Thus, by looking at children's performance as a function of time away from school for vacations, evidence is found once again for a causal relationship between schooling and IQ.

Sixth Type of Evidence: The Effect of Early-Year Birth Dates

Consider the effect on intelligence of being born early versus late in the year. A naturalistic experiment again sheds light on the intellectual benefit of attending school. Most states have restrictions on the age at which students can enter schools as well as policies mandating compulsory attendance until age 16 or 17. Neal and Johnson (as cited in Heckman, 1995) examined the relationship between IQ and the number of years of schooling completed. Within a given birth year, the number of years of schooling completed are the same for those born during the first nine months of the year, but the amount of school attendance drops off for those born during the final three months of the year. This is because these individuals are statistically more likely to enter school a year later as a result of having been born too late in the year for entry with the rest of their birth-year cohort. Eventually, these individuals come of age at a point when they have been in school one less year than the rest of their birth-year cohort. After coming of age, some individuals leave school. Hence, students with late-year births are more likely to stay in school one year less than students with early-year births because students with late-year births reach the age for school leaving (16 or 17 years) after one less year of school attendance.

Viewed from this perspective, a child born during the last three months of the year can be seen as belonging to a different cohort than a child born during the first nine months of the year. Neal and Johnson (as cited in Heckman, 1995) showed that for each year of schooling that is completed, there is an IQ gain of approximately one-quarter standard deviation (i.e., 3.5 points). Students with late-year births, as a group, show this effect because their group IQ score is lower.

Given the random processes involved in being born early versus late within a given year, one can assume that the genetic potential for intelligence is the same in these groups. The cause of lower IQs among students with late-year births is entirely a function of their being more likely to attend school one less year than their peers born during the first nine months of the year. In addition, Angrist and Krueger (1991) found that those who spent an extra year in school earned between 7% and 10% more than their peers who dropped out a year earlier but at the same chronological age. Thus, by looking at children born at different times in the year, one finds more evidence supporting a causal relationship between schooling and IQ.

Seventh Type of Evidence: Cross-Sequential Trends

One of the best documented studies of the effect of schooling was actually intended as a methodological demonstration of cohort-sequential analysis rather than as a study of the effect of schooling per se. Baltes and Reinert (1969) ran-

domly sampled 630 children from 48 elementary schools in Saarbrucken, Germany. Three cross-sections of 8-10-year-olds who were separated in age by 4-month intervals were administered a German version of the Primary Mental Abilities Test (Thurstone & Thurstone, 1962). Because the German school system at that time required entering children to be 6 years of age by April 1, it was possible to compare same-aged children who had received up to a year difference in schooling. For example, a child born in March who was 8 years and 2 months old in May could be compared with a child born in April who was 8 years and 2 month old in June. The former child would have received an additional year of schooling by the time he or she was 8 years old. Baltes and Reinert found a substantial correlation between the length of schooling completed and intellectual performance among same-aged, same-SES children. In fact, highly schooled 8-year-olds were actually closer in mental abilities to the least schooled 10-year-olds than they were to the least schooled 8-year-olds! Thus, this seventh type of evidence provides additional support for the influence of schooling on IQ.

Contrasting the Roles of Schooling and IQ in Economic Outcomes

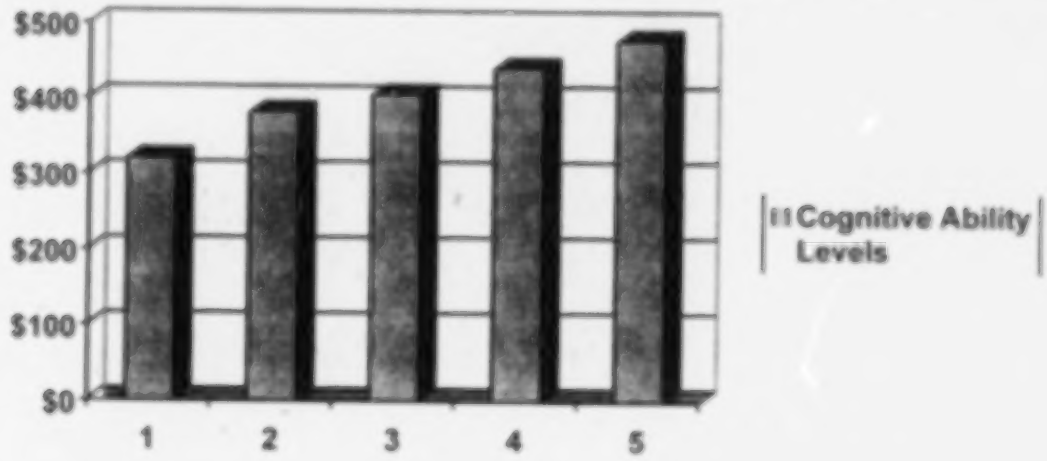
Now that we have provided seven forms of evidence supporting the effects of schooling on IQ, we return to an observation we made at the beginning of this article. It is well documented that IQ influences earnings and that schooling also influences earnings. But are these two effects independent? Consider an empirical example of IQ's effect on schooling and schooling's effect on IQ. How does the relationship between schooling and IQ inform the analysis of why some people earn more than others?

At the outset of this article, we described the hypothesis that schooling is a marker for IQ and, therefore, that the reason school attainment is associated with economic outcomes is because of the "long reach" of IQ, because workers who score higher on IQ tests get more valued positions and get promoted in them faster than their lower IQ peers. None of the seven types of evidence we reviewed disconfirm this hypothesis (i.e., that IQ influences job performance and advancement). In addition, it is easy to find evidence that differences in intelligence are responsible, in part, for the length of time someone remains in school. As seen below, intelligence test scores differ among students at any given level of schooling.

At each level of schooling completed—graduating from high school, junior college, four-year-college, and so on—there are pronounced differences in intellectual ability among students at the same level. Some high school students function at higher levels of verbal and mathematical ability than do others, and the same is true for college graduates. So, regardless of the intellectual advantage conveyed by staying in school, the across-the-board IQ boost cannot account for the fact that smarter students may stay in school longer, on average. Nor can this school-induced increase in IQ explain the substantial differences in intelligence that exist among students at the same level of education. There will

always be individual differences in intelligence. So, we are left wondering whether the differences in earnings associated with staying in school are due to inborn differences in intelligence rather than to variations in schooling. Below, we suggest that the picture is more complicated than this simple assertion, and we conclude that both schooling and intelligence make independent contributions to lifetime earnings.

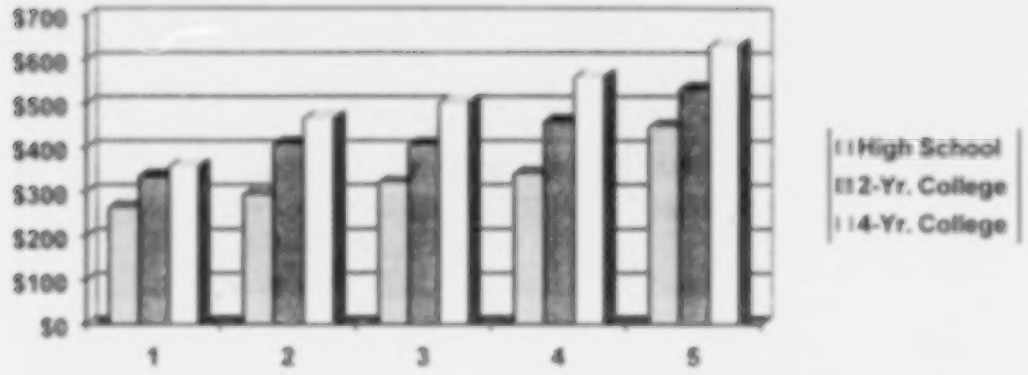
FIGURE 1: WEEKLY WAGES BY LEVEL OF COGNITIVE ABILITY



Consider the data on IQ, schooling, and earnings represented in Figure 1. As can be seen in Figure 1, even among those with comparable levels of schooling, the higher a person's level of intellectual ability, the higher will be that person's weekly earnings. As shown in this figure, there is a linear trend for a rise in earnings to be associated with increasing cognitive ability. Workers with the lowest level of intellectual ability earn only two thirds of what workers at the highest level earn. Because differences in schooling are statistically controlled in Figure 1, the source of the rise in earnings must be due to some other factors, such as variations in intellectual ability.

Differences in intellectual ability level do not entirely explain who earns more income. In Figure 2, we disaggregated the data from Figure 1 according to the verbal aptitude scores of students. It can now be seen that higher levels of school attainment are associated with higher weekly earnings, regardless of differences in level of intellectual ability. For example, high school graduates who possess the same level of verbal ability as college graduates nevertheless earn approximately 31% less income. And the same is true for every other ability level we have studies. Schooling appears to provide a credential that is needed for entry into certain high-paying jobs. But success in these jobs may have little to do with the intellectual ability level per se of job applicants. In short, two people may reason equally well and may possess similar knowledge, but the person who went to college will earn substantially more than the person who did not go to college. College graduates get better jobs than nongraduates, independent of their ability levels.

FIGURE 2: WEEKLY WAGES IN 1992 BY LEVELS OF SCHOOLING AND COGNITIVE ABILITY



Note: The data are from Bronfenbrenner et al. (1996). Yr. = year.

CONCLUSION: THE INTERDEPENDENCY OF IQ, SCHOOLING AND INCOME

It is hardly a novel idea that both school attendance and intelligence seem to influence economic outcomes; variants of this position have been around for much of this century, although it has been difficult to disentangle their causal pathways (Ceci, 1991). In this article, we have presented some unexpected evidence that shows that variation in the amount of schooling completed is related not only to variation in intelligence test scores but also to variation in economic outcomes.[2] Both the relationship between schooling and earnings and the relationship between intelligence and earnings are influenced by the joint relationship between schooling and intelligence. In turn, this relationship may be the result of the action of a third variable, one having to do with temperament or personality: Consider that both school attainment (mean number of years of schooling completed) and intelligence are highly heritable, both heritability

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[2] Some theories of intelligence, most notably Cattell's theory of Gf-Gc (see Horn, 1994), could be invoked to account for the differential effect of schooling and IQ on economic outcomes, as suggested by one of the reviewers. Cattell envisioned crystallized intelligence (Gc) as more responsive to the environment, including schooling, than fluid intelligence (Gf), which is presumed to be relatively more influenced by neurological development. Extensive statistical evidence supports this distinction, involving the factoring of more than 40 so-called primary cognitive abilities into approximately 10 so-called family factors, which in turn can be factored into the Gf-Gc second-order distinction. (The latter can itself be factored into a single factor, although proponents suggest that Gf-Gc represents a reasonable compromise.) Hence, one could posit that the type of intellectual abilities indexed by Gf (e.g., certain types of visual and quantitative reasoning) might be linked to economic achievements that exist independently of the types of abilities that schooling fosters (e.g., semantic interpretations). The problem posed by Gf-Gc theory in the context of this article is that it is nonspecific as to actual pathways through which this differential effect on schooling and economic outcomes occurs. At the level of second-order factors themselves (i.e., Gf-Gc), there is no substantial predictive differential between Gf and Gc in predicting economic outcomes and schooling outcomes—each does so between .40 and .50. Alternatively, if the composite primary abilities that comprise Gf and Gc are disaggregated, one is left with very little data to predict either economic or schooling outcomes. Notwithstanding this problem, there is an empirical issue that remains unresolved, namely, how to *(continued)*

coefficients (h^2s) between .60 and .80 (see Herrnstein & Murray, 1994, for data on the heritability of intelligence). Perhaps some variable such as hyperactivity or disposition tends to influence how long one stays in school as well as how well one does on an IQ test. It remains for future research to tease apart such variables.

In view of the data presented in Figures 1 and 2, the economic advantage associated with schooling cannot be reduced solely to the long reach of high IQ among students with more schooling, any more than the economic advantage of having a high IQ can be reduced solely to having stayed in school longer. In addition to schooling and intelligence contributing independent additive variance to the prediction of earnings, each appears to contribute interactive variance. However, the econometric analyses that have established that each additional IQ point may lead to a decision by a student to stay in school a little longer (e.g., see Heckman, 1995) have heretofore not considered the indirect effect that staying in school has on IQ.

Consider what would happen to earnings if IQ were all that mattered. If income was distributed solely according to differences in IQ, then a far less asymmetric distribution of income would be expected than we now have. Many more people would earn close to the national mean, and far fewer would earn at either of the extremes. In a recent economic analysis, Dickens, Kane, and Schultze (1995) showed that if IQ were equated among all people and only nonintellective variables were allowed to vary (e.g., parental SES and motivation), then the resultant income distribution would resemble the one we now have. Conversely, if all nonintellective differences were equated and income was distributed soley in accordance with differences in IQ scores, then a far more egalitarian income distribution would be observed than the one we now have.

Another way to think about this is to compare the incomes of those who possess the top 10% of IQs with the incomes of those who possess the top 10% of wages. The incomes of those with the top 10% of IQs in Herrnstein and Murray's (1994) National Longitudinal Survey of Youth sample earned 55% more than average IQ persons earned. In contrast, the top 10% of wage earners in this sample earned 200% more than the average person earned! Hence, the proportion of the variation in income that can be explained on the basis of variation in IQ is actually rather small. In fact, income varies much more because of non-IQ differences than because of IQ differences, leading one team of economists to remark, "If all that mattered was [IQ] scores, U.S. society would clearly be very egalitarian. Eliminating differences due to IQ would have little effect on

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reconcile the claim that Gf declines with age but Gc does not, at least not before very old age (Horn, 1994). Flynn (1987) reported longitudinal data from a Dutch sample showing that the largest gains during adult development were for Gf measures and the smallest gains were for Gc measures, in opposition to the theory of Gf-Gc. Moreover, Cahan and Cohen (1989) reported that the largest gains among Israeli school children were for Gf measures, the very ones for which schooling was postulated to have less impact. Although not ruling out the potential usefulness of Gf-Gc theory to explain the present findings, we must await resolution of these empirical and conceptual questions.

the overall level of inequality" (Dickens et al., 1995, p. 20).

So, in conclusion, what can we say about the value of schooling? We have attempted to show that staying in school matters both for the maintenance of IQ and for future earning power. For each additional month or year of schooling, a worker will reap substantial economic benefits throughout his or her lifetime. Some of these benefits may derive from exposure to school-taught skills that have economic advantages, such as becoming comfortable dealing with hypotheticals and having the ability to learn specific job-related knowledge on the spot (e.g., an applicant for the position of shipping clerk may be given preferential hiring if he or she understands how to convert pounds and tons to their metric counterparts). But we have argued that some of the benefits that result from staying in school probably derive from its indirect effect on intelligence, just as some of the contribution that intelligence makes to earnings probably derives from its synergy with school-related variables.

Finally, of necessity, we have had to make short shrift of many variables that might complicate our argument, such as the hyperactivity example mentioned earlier. Path models would be necessary to quantify the magnitude of school and IQ contributions to earnings, but because of the unavailability of the necessary data, we were unable to report such analyses (i.e., it would be necessary to estimate in a path-analytic framework the net effect of IQ on schooling—after the influence of schooling on IQ was assessed). As another example, it could be argued that the effect of schooling varies with age and historical cohort. Perhaps schooling variations among young adults are considerably smaller than among older adults as a result of nearly universal school attendance laws enacted during the second half of this century. If this is true, then the contribution of schooling differences to variations in earnings among younger adults would be smaller after taking into account the contribution of intelligence. Finally, schooling itself may not be static.[3] It may be the case that as IQ changes over the life course, it influences decisions to stay in school. Hence, what looks like a schooling effect on IQ may in actuality be an influence of changes in IQ on the decision to remain in school (e.g., individuals who experience an elevation in IQ may decide to remain in school longer than individuals who experience a decline in IQ). These issues await future data that will enable further evaluation of the interrelationship of IQ and schooling.

[3] This comment was made by a reviewer of this article.

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Preaching to the Choir:
TV Advisory Usage Among Parents of Gifted Children

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Abstract

This investigation examines the use of the MPAA television advisory ratings in the decision-making of parents of intellectually gifted children and explores the manner by which ratings information is incorporated into rules and regulations about television in the home. It comes on the heels of published reports suggesting the general inadequacy and counter-productivity of the age-based ratings. In comparison to parents of non-gifted children, parents of gifted children were more likely to utilize TV ratings information in the mediation of their children's televiewing. They tended to employ a highly inductive (communication-oriented) style of child rearing and a highly evaluative (discussion-based) method of TV mediation, tended to believe that television can have significant positive and/or negative effects on children, and were more concerned with cognitive- and affective-level effects. The possible ramifications of these findings with regard to the new content-driven ratings campaign and forthcoming V-chip technology are discussed.

It has long been a well known fact that by the age of 18, most American youngsters will have spent more time in front of a television set than behind a school desk. Most parents and educators recognize television as a major socializing agent, and concerns about television's portrayal of violence and sex and its impact on young children have been long-standing (see, for example, Bandura, 1963). The question of what types of children are most influenced by television is a recurrent theme in the scientific literature, particularly since Schramm, Lyle, and Parker's (1961) conclusion that "for some children, under some conditions, television is particularly harmful" (p. 1). More recently, Sprafkin, Gadow, and Abelman (1992) noted that intellectually gifted children are especially vulnerable to attractive television portrayals. They tend to watch more television at an earlier age and are exposed to more age-inappropriate programming than their non-gifted counterparts. During the early school years, intellectually gifted children are also likely to perceive many of the fictional characters found in sophisticated adult-oriented programming as real and fail to accurately comprehend many of the more complex visual techniques employed as narrative devices in these programs (see Abelman, 1992; Hunter, 1992), leading to misinterpretation of television information.

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Until recently, neither the television industry nor the government have taken much initiative to address the concerns of parents and educators and the potential vulnerability of young children (see Abelman, 1995). However, in January 1996, with the House voting 414 to 16 and the Senate voting 91 to 5, the first major rewrite of communications regulation in half-century was approved. One provision in the new Telecommunications Act required every TV set sold in the U.S. to come with the ability to block programming based on an electronically encoded rating. The television industry itself was required to develop the rating system, which would identify "violence, sex and other indecent material" (cited in Stern, 1996, p. 9), and agree voluntarily to broadcast signals containing such ratings. In December 1996, Jack Valenti, chief executive of the Motion Picture Association of America (MPAA) and head of the ratings effort, presented an on-screen system that separated general entertainment programs on broadcast and cable television into four age-based categories and children's programming into two: TV-M (mature audiences only); TV-14 (may be inappropriate for children under 14); TV-PG (parental guidance suggested); TV-G (suitable for all audiences), TV-Y7 (suitable for children 7 and older), and TV-Y (suitable for children of all ages).

It did not take long before critics of the proposed rating system went public with their concerns. The Parents Television Council—the entertainment-monitoring arm of the conservative media watchdog Media Research Center—pronounced the MPAA ratings "hopelessly vague," "inconsistent," and "contradictory" (Fleming, 1997a, p. 22). National Parent Teacher Association president Joan Dykstra called the industry's age-based system "confusing and insufficient" (Fleming, 1997b, p. 8). Senator Conrad Burns (R-Mont.), chairperson of the Communications Sub-committee, feared that parents would find the rating system counter-productive when attempting to influence their children's televiewing habits and practices (Aversa, 1997). Even Edward Markey (D-Mass.), father of the V-chip legislation that prompted the ratings, said that "the industry system doesn't give parents information they need to make appropriate decisions for their own kids, and it won't give them the choices they need to block programming" (Fleming, 1997a, p. 22). The Annenberg Public Policy Center (Bash, 1997; see Mifflin, 1997) and the National Association of Broadcasters (Greenberg, Rampoldi-Hnilo, & Ver Steeg, 1998) confirmed this observation by reporting that almost two-thirds (65.3%) of parents were not using the rating system to guide their children's viewing. In response, legislative efforts to revamp the system were put into effect. In July 1997, television programmers agreed to modify the age-based rating system by adding symbols to alert viewers about violent (V) and sexual (S) content, coarse language (L), and suggestive dialogue (D) (see Farhi, 1997; Ostling, 1997).

Although the relative failure of the original age-based television rating system has been noted, there has been little insight into how or why failure occurred. Furthermore, a comprehensive assessment of the actual use of the advisory ratings by one-third of American households has yet to be conducted. The research

reported here attempts to examine the manner by which the advisory ratings are incorporated into rules and regulations about television in the homes of intellectually gifted children. This investigation also profiles the types of parents most and least likely to use the ratings in their decision-making, and offers insight into the likely success of the new content-driven ratings campaign and forthcoming V-chip technology.

Parental Mediation

The theoretical assumption on which any media advisory system is based—that parents can directly impact on their children's media use—is well grounded in the scientific literature. A substantial body of research indicates that parents have the potential to influence their children's media consumption patterns (Austin, 1980; Gunter & Svennevig, 1980; Nivin, 1960; Singer, Singer, Desmond, Hirsch, & Nicol, 1988), interpretations and acceptance of media content (Christenson, 1992; Clifford, Gunter, & McAleer, 1995; Davies, 1997), and the learning and performance of antisocial and prosocial behaviors portrayed in popular media content (Berry & Asamen, 1993; Brown & Bryant, 1990).

Although parents can affect their children's television use through intervention, few parents actually become directly involved in or actively exercise control over their children's selection, consumption, and interpretation of television information. Abelman (1995), Desmond, Singer, Singer, Calam, and Colimore (1985), McLeod, Atkin, and Chaffee (1972), and Steiner (1963), among others, discovered that less than half of the parents in their respective samples forbade exposure to certain "adult" or "offensive" shows, set bedtime limits on viewing, or made comments on the nature of the content being viewed. Researchers have found that as television set saturation (see Hefzallah, 1987), VCR usage (see Lindlof & Shatzer, 1990), channel number (see Kubey & Csikszentmihalyi, 1990), cable access (see Atkin, Heeter, & Baldwin, 1989) and broadcast network options (see Andreasen, 1990; 1994) increased over the years, parental control over television and family co-viewing dramatically decreased. Desmond, Singer, and Singer (1990) noted that "parents and children reported instances of general and television-oriented mediation with a relatively high degree of reliability, and yet we observed few instances of such activity during home visits" (p. 304).

That almost two-thirds of parents did not use the age-based MPAA rating system to guide their children's viewing is consistent with a literature laden with assessments of government warning mediations and industry advisory interventions on a variety of media. The impact of specially produced, parent-targeted television warnings (Wurtzel & Surlin, 1978), film ratings (Austin, 1980), music warning labels (Christenson, 1992), radio public service announcements and newspaper articles (Neuendorf, 1979), and TV viewing guides (Greenberg, Abelman, & Cohen, 1990) have been examined. Although the informational materials were heard/read by the majority of the target audiences, the resultant changes in parental mediatory practices were insignificant in each investigation. In addition, Greenberg, Abelman, and Cohen (1990) found that the children

watched the programs that were identified as "warranting parental supervision or discretion." Similar "boomerang" results were found in interventions reported in Heald (1980), Curry (1983), Cantor and Harrison (1996), Cantor and Nathanson (1997), and Desmond (1997).

Interestingly, several specific factors have been identified in the literature that help determine how much and which form of mediation is most likely to occur in a given household. Chief among them are child rearing practices, parental perceptions of television effects, children's cognitive abilities, children's television consumption levels, and the gender of the parent/child. Each of these factors offers insight into whether and how the new television rating system would be employed in the household and offers a profile of the most and least likely receptive users of the rating system.

Child Rearing Practices

Two main categories of child rearing practices have been identified by Aronfreed (1969, 1976) and Hoffman (1970-1975), and subsequently applied to parental mediation of television in recent years—induction and sensitization. The main difference between these two modes of child rearing is that induction is communication-oriented and sensitization is based on the exercise of actual or implied power. Inductive practices "tend to make the child's control of its behavior independent of external contingencies. In contrast, [sensitization] merely sensitizes the child to the anticipation of punishment" (Aronfreed, 1969, pp. 309-310). Induction techniques include the use of reasoning, explanation, and appeals to the child's pride and achievement, and they exert little external power over the child. Parents who engage in this form of discipline/child rearing typically point out to the child why one course of action may be better than another for the child's own well-being or because of effects on others. Sensitization "includes physical punishment, deprivation of material objects or privileges, the direct application of force, or the threat of any of these" (Hoffman, 1970, p. 285). Inductive and sensitizing techniques are often employed in combination, to varying degrees.

Numerous studies have demonstrated that the type of child rearing practices (see, for example, Davis & Rimm, 1998; Osofsky & Oldfield, 1972; Sigel, McGillicuddy-DeLisi, & Goodnow, 1992) and comparable disciplinary style (see, for example, Socha & Stamp, 1995; Web, Mechstroth, & Tolan, 1982) are related to children's social and moral behavior in general. Several researchers have determined that the interaction and socialization style of parents are related to children's use of television information in particular. Singer, Singer, and Rapaczynski (1984) found that parents who most regularly employed sensitization techniques in their child rearing had few rules about television. This finding was also evident in a follow-up investigation by Desmond, Singer, Singer, Calam, and Colimore (1985). Similarly, Abelman (1986) found that parents who were high sensitization/low inductive tended to be infrequent mediators of television. However, when they did intervene in their children's televiewing, they

were most likely to employ more restrictive forms of mediation—that is, the deprivation of a favorite television program as a disciplinary device. Parents who were high inductive/low sensitization were more frequent mediators and more likely to employ evaluative forms of mediation—that is, the purposeful discussion and/or criticism of programs and commercials. The author also found that low inductive/low sensitization parents were largely infrequent and unfocused mediators, using television for reward/punishment without rationale, coviewing with their children with little direct intervention, and recommending programs for viewing or not viewing without explanation. Consequently, when examining the impact of the television rating system on parental mediation, it is reasonable to expect that:

H1: Parents who engage in high induction/low sensitization child rearing practices are more likely to employ the rating system in their mediation than are parents who are high sensitization/low induction;

H2: Parents who engage in high induction/low sensitization child rearing practices are more likely to use the rating system in their discussions of programs rather than as a method of restrictive mediation; and

H3: Parents who engage in high sensitization/low induction child rearing practices are more likely to use the rating system to directly restrict viewing preferences or practices than any other form of mediation.

Parental Perceptions of Television Effects

Among the most prominent factors that are likely to contribute to the amount of parental control of the home-televiewing situation are parents' perceptions of television's impact on their children. Mills and Watkins (1982) and Bybee, Robinson, and Turow (1982) discovered that one reason for the lack of parental mediation found in the literature was that many parents did not perceive television to be a harmful or beneficial force in their children's lives. According to the authors, "there was a clear relationship between parents' awareness of possible effects of televiewing and subsequent enforcement of rules at home" (Mills & Watkins, 1982, p. 11). Similarly, Austin (1993) found that a greater knowledge of and skepticism about the television medium led to more active mediation. Consequently, when examining the impact of the rating system on parental mediation, it is reasonable to expect that:

H4: Parents who believe that television is likely to have significant positive or negative consequences on their children's behavior are more likely to employ the rating system in their mediation than are parents who perceive little or no consequences of televiewing.

Abelman and Pettey (1989) found that parents who were primarily concerned with the behavioral effects of television (e.g., the medium influencing how children behave during and after viewing) were more likely to mediate their children's televiewing than other parents, and were more likely to employ restrictive methods of mediation. In addition, parents who were more concerned with the cognitive- and/or affective-level effects (e.g., the medium influencing what chil-

dren think about and their thought processes; the medium influencing how chilren feel about themselves and others) were more likely to use evaluative mediation than other parents. These findings were confirmed by Van Evra (1998) and Desmond, Singer, and Singer (1990), and duplicated by Abelman (1991). Consequently, when examining the impact of the rating system on parental mediation, it is reasonable to expect that:

H5: Parents who perceive television's impact to be primarily behavioral are more likely to employ the rating system as a method to directly restrict viewing preferences or practices than are parents who perceive television's impact to be more cognitive and/or affective; and

H6: Parents who perceive television's impact to be primarily cognitive and/or affective are more likely to employ the rating system in their discussions about television than are parents who perceive television's impact to be primarily behavioral.

Children's Cognitive Abilities

In any discussion of parents' interactions with and disciplining of their children, and the resultant outcome of these activities, it is important to point out that children are not mere passive recipients of parental child-rearing practices. The nature of the child often dictates or shapes the type, intensity, and regularity of parental interaction and discipline, as well as how a child is likely to react to those activities. According to Brody, Pillegrini, and Sigel (1986):

> Just as researchers realized, a decade and a half ago, the limitations of unidirectional models of socialization, they today recognize that families comprise several subsystems (i.e., spousal or marital, parent-child, and the sibling subsystem), each of which affects and is affected by events that occur in the other subsystems. In particular, this suggests that parenting both influences and is influenced by the child. (p. 291)

This observation explains the tendency for the inductive communication style to be more frequently found among parents of intellectually gifted children (Colangelo & Dettman, 1983; Morrow & Wilson, 1961; Roedell, Jackson, & Robinson, 1980), particularly when compared with other types of children (see, for example, Cummings & Maddux, 1985; Lynch & Lewis, 1988). In general, parents of gifted children are significantly clearer and more open in their communication with their children than parents of academically average children (Perkins, 1989).

In addition to being typically inductive in their child rearing, parents of intellectually gifted children are particularly conscious of their children's learning processes (Clark, 1997; Socha & Stamp, 1995) and the sources of external stimuli that tend to advance or hinder their children's intellectual progression (Page, 1983) when compared with other parents. This concern clearly generalizes to their perceptions of the likely impact of television on their children. According

their perceptions of the likely impact of television on their children. According to Sprafkin, Gadow, and Abelman (1992), gifted children watch fewer hours of television than their age-mates from birth to adolescence but tend to watch more television during both the early school years and early adolescence—stages when they are arguably most vulnerable to social influences. They are also more likely to watch adult-oriented programming at an earlier age than their peers. As a result, parents of intellectually gifted children generally believe that television can have both positive (e.g., increases curiosity) and negative (decreases reading ability) affective- and cognitive-level effects on their children. Given this particular configuration of child rearing practices, parental perceptions of the role of television in their children's lives, and children's TV consumption habits, it is reasonable to expect that:

H7: Parents of intellectually gifted children are more likely to employ the rating system in their mediation than are parents of academically average children;

H8: Parents of intellectually gifted children are more likely to employ the rating system in their discussions about television than are parents of academically average children; and

H9: Parents of children who are high consumers of television are more likely to employ the rating system in their mediation than are parents of low consumers.

Gender

A significant amount of research suggests that how a parent responds to a child may be dependent on whether the child is male or female. Margolin and Patterson (1975), Hatfield and Abrams (1995), and Randall (1995), for example, have demonstrated that fathers provided almost twice as many positive reactions to their sons as to their daughters. Maccoby and Jacklin (1974) and Prusank (1995) found that boys were punished more often than girls and received more praise and encouragement by mothers. Baumrind (1971), Hoffman (1975), and Socha and Stamp (1995), among others, have suggested that fathers tended to be more authoritarian or sensitizing than mothers when engaged in child rearing and disciplining. There is also some evidence that parents' rules about television viewing vary with the gender of the child. Barcus (1969) and Abelman (1985), for example, found that boys had fewer TV rules than girls. Similarly, stricter and more frequent rule-making has been observed for girls (Greenberg & Dominick, 1969; Lyle & Hoffman, 1982), particularly when fathers were in charge of television mediation. It is reasonable to expect that:

H10: Parents of girls are more likely to employ the rating system in their mediation than are parents of boys; and

H11: Fathers are more likely to employ the rating system as a method to directly restrict viewing preferences or practices than are mothers or parental dyads.

Method

Participants

The sample of parents was generated from 588 households with school-labeled academically average (N = 459; 79%) and intellectually gifted (N = 129; 21%) second grade children selected from 40 classrooms across 10 elementary schools in and around a mid-size Midwestern city. Gifted students met state and local guidelines for placement in special education or pull-out programs. The children ranged in age from 7 to 8, with a mean age of 7.9 years. Children in this age group were selected because they have been identified by the MPAA (Stern, 1996) as in the greatest need for parental mediation, thereby resulting in the TV-Y7 (suitable for children 7 and older), TV-G (suitable for all audiences), and TV-Y (suitable for children of all ages) rating categories. They have also been among the primary targets of the majority of social intervention efforts reported in Clamp (1988), Brown (1991), and Van Evra (1998). Fifty-three percent of the children were girls. Parent participants were recruited by letter, which sought the "only or primary rule-making and rule-enforcing parent in the household, if one exists, or both parents if [they are] equally involved in rule-making and rule-enforcing." The sample consisted of dyads (49%), fathers (29%), and mothers (22%).

Measures

Child Rearing Practices. Parental child rearing orientations were assessed through an instrument created by Hoffman and Saltzstein (1967) and modified by Korzenny, Greenburg, and Atkin (1979) and Abelman and Pettey (1989). Parental reactions toward the child's behavior were obtained in response to several hypothetical situations. Each parent was presented with eight situations, four positive and four negative. Nine possible responses were provided for the four items that compose the positive situation index. Similarly, nine possible responses were provided for the four items that compose the negative situation index. Parents were asked whether each of the responses represented what their actual response would be should the hypothetical situations occur (response ccategories: no, maybe, yes—coded 0 to 2). Final scores for each of the 18 response items were summed across the various social situations. The means were typically higher for the positive than for the negative situations; the means for the induction strategy items were typically higher than for the sensitization items.

The items were submitted to a principal factor analysis with varimax rotation, limiting the extraction of factors to the two hypothesized induction and sensitization dimensions. Factor 1 underlies the inductive orientation, accounting for 37% of the total variance with an eigenvalue of 6.13 (alpha = .90), and factor 2 comprises the sensitizing orientation of parental discipline, accounting for 23% of the variance with an eigenvalue of 4.02 (alpha = .89). Loadings of .35 were considered the cutoff point for the factor loadings. The proportion of inductive and sensitizing child rearing practices across the subjects employed in this investigation can be found in Table 1.

	High Induction/ High Sensitization	High Induction/ Low Sensitization	Low Induction/ Low Sensitization	Low Induction/ High Sensitization
Parents of Academically Average Children	2%	28%	12%	48%
Parents of Intellectually Gifted Children	21%	72%	2%	5%

Parental Perceptions of Television Effects. The second part of the questionnaire asked parents about their attitudes toward the likely effects of television on children. Fifteen statements were presented that referred to various commonly debated consequences of the television/child relationship (see Abelman, 1987), including increases and decreases in reading ability, verbal ability, self-concept, the desire for immediate gratification, creativity, knowledge and awareness of the world, attention span, curiosity, desire to learn, interest in reading, stereotyping of roles/genders, level of physical activity, appreciation of others, and aggressive behavior.

Responses noted whether parents felt television was "not a contributory cause at all," a "contributory cause of little importance," a "somewhat important contributory cause," an "important contributory cause," or a "very important contributory cause," (coded 0-5). These items were also submitted to a principal factor analysis with varimax rotation and resulted in three factors. Factor 1 underlies parents' perceptions of "cognitive level effects" (TV influencing what and how children think) accounting for 31% of the variance and having an eigenvalue of 5.47 (alpha = .92). Factor 2 underlies parents' perceptions of "affective level effects" (TV influencing what and how children feel about themselves and others), which has an eigenvalue of 4.12 and explains 27% of the variance (alpha = .87). Factor 3, reflecting "behavioral level effects" (TV influencing what and how children behave), has an eigenvalue of 2.97 and explains 18% of the variance (alpha = .91). In addition, final scores for each of the 15 items were summed. Those with a mean score of 3 or greater were classified as believing that television is likely to have significant positive or negative consequences on their children. The proportion of parents' who believed that television has significant cognitive, affective, and behavioral level effects on their children across the subjects employed in this investigation can be found in Table 2.

Table 2. Perceived Effects by Parents

	Cognitive-Level	Affective-Level	Behavioral-Level
Parents of Academically Average Children	8%	63%	78%
Parents of Intellectually Gifted Children	76%	52%	12%

Parental Mediation/Ratings Usage. The type and quantity of parental mediation of television were assessed through a modified version of the instrument utilized by Bybee, Robinson, and Turow (1982). A series of 14 questions

ment utilized by Bybee, Robinson, and Turow (1982). A series of 14 questions asked parents about the frequency (often, sometimes, rarely, never) with which they used certain methods, in conjunction with TV ratings information, to control or guide their child's televiewing. They addressed the use of TV ratings to pick shows to watch or to avoid, to set limitations on when and what to view, to inspire the switching of channels, to explain or discuss programming, to inspire co-viewing, and to facilitate the use of TV for reward or punishment. The level of mediation employing TV ratings was determined by assigning numerical values to each response category (coded 4-1) and summed across the 14 items that comprise the mediation index. Parents were categorized as being high mediators (range = 43-56, mean = 49), moderate mediators (range = 29-42, mean = 37), and low mediators (range = 28-14, mean = 17) (see Table 3).

Table 3. Quantity of Parental Mediation

	High	Moderate	Low
Parents of Academically Average Children	12%	40%	48%
Parents of Intellectually Gifted Children	23%	33%	44%

The items were then submitted to a principal factor analysis with varimax rotation to determine underlying dimensions of mediation. Three distinctive mediation strategies emerged. The first was the Restrictive Mediation strategy (accounting for 49% of the variance and having an eigenvalue of 6.79), which focused on the physical removal of the child from the medium in the form of specific viewing hours and the forbidding of specific programs based on ratings information (alpha = .92). The second was the Evaluative Mediation strategy (explaining 20% of the variance and having an eigenvalue of 5.01), which entailed the purposeful discussion of TV programs and ratings between parents and children (alpha = .90). The third factor reflected the Unfocused Mediation strategy (explaining 8% of the variance and having an eigenvalue of 2.95), and entailed casual co-viewing and the use of television for punishment and/or reward (alpha = .84). The proportion of parents who employed restrictive, evaluative, and unfocused television mediation strategies across the subjects employed in this investigation can be found in Table 4.

Table 4. Parental Mediation Strategies

	Restrictive	Evaluative	Unfocused
Parents of Academically Average Children	58%	18%	24%
Parents of Intellectually Gifted Children	12%	73%	15%

Children's Television Consumption. Three weeks prior to the parents' participation in this investigation, children were asked to keep a two-week diary of their television viewing behavior as part of a daily homework assignment. In comparison with A.C. Nielsen's (1996) measures of average child audience

viewing activity, children viewing: (1) under 1 hour per day were identified as "low consumers;" (2) between 1-4 hours per day were identified as "moderate consumers;" and (3) over 4 hours per day were identified as "high consumers." The proportion of low, moderate, and high consumers among the child subjects employed in this investigation can be found in Table 5. Distribution of viewership across and within these two categories of learning capability is consistent with the research literature (see Sprafkin, Gadow, & Abelman, 1992).

Table 5. Television Consumption

	High-Level Consumption	Moderate-Level Consumption	Low-Level Consumption
Academically Average Children	80%	48%	12%
Intellectually Gifted Children	55%	45%	8%

Statistical Analysis

Canonical correlation was the analytical tool used to examine the multivariate associations between parental ratings usage, child rearing styles, parent's perceptions of TV's impact, children's cognitive abilities, children's TV consumption habits, and gender. Similar to loadings in factor analysis, canonical component loadings represent the correlations between the original variables and the canonical variates which are linear composites of the original variables. Also like factor analysis, there may be more than one orthogonal linear composite or canonical root extracted from the data (see Ducey, 1986; Hair, Anderson, Tatham, & Black, 1992). To reduce possible misinterpretations that might result from multicollinearity, structure coefficients were computed by summing the product of canonical loadings and standardized scores of the variables for each set.[1]

Results

The canonical correlation analysis (see Table 6) indicates that three roots are signficant at the .001 level.[2] The first canonical root (Rc = .44) explained 18.2% of the variance in common between the canonical variates. Set 1 depicts a positive relationship between Evaluative mediation and a high level of parental mediation of television, as well as negative correlation with low mediation. Set 2 indicates positive associations among parents' perceptions of cognitive- and affective-level effects, perceptions of television's signficant impact, high induc-

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[1] Although alternatives to canonical correlation have recently come into fashion, this analysis has been the method of choice in the body of research on which this investigation is based and with which our findings will be compared (i.e., Abelman, 1987). It should also be noted that one particular advantage of canonical correlation involves its ability to accommodate metric as well as nonmetric data for either the dependent or independent variables; it places the fewest restrictions on the types of data on which it operates. Because some measures in this investigation are essentially ordinal composites (i.e., nonmultivariate-normal), canonical analysis remains a more appropriate test than others that are designed for metric data.

[2] The significance of canonical roots is assessed through the Bartlett's chi-square test.

tive/low sensitization child rearing practices, high induction/high sensitizing practices, and parental dyads. Set 3 reflects a positive association between child giftedness, female gender, and moderate and low levels of television consumption.

Table 6. Canonical Correlates

	Root 1		Root 2		Root 3	
	Canonical Variate	Structure Coefficient	Canonical Variate	Structure Coefficient	Canonical Variate	Structure Coefficient
Set 1: Parental Ratings Usage						
Restrictive Mediation	-0.24	-0.21	0.45	.87*	-0.35	-.67*
Evaluative Mediation	0.82	.92*	-0.18	-0.19	-0.20	-.22*
Unfocused Mediation	0.09	0.12	0.01	0.17	0.74	.85*
High Mediation	0.80	.87*	-0.10	-0.16	-0.22	-0.49
Moderate Mediation	0.02	0.09	0.82	.94*	0.04	0.06
Low Mediation	-0.54	-.73*	0.07	0.09	0.57	.89*
Redundancy Coefficients	[.09]	[.15]	[.08]	[.12]	[.04]	[.03]
Set 2: Parent Attributes						
High Inductive/Low Sensitizing	0.81	.93*	-0.02	-0.07	-0.12	-0.14
High Sensitizing/Low Inductive	-0.79	-.84*	0.45	.87*	-0.14	-0.12
Low Inductive/Low Sensitizing	0.08	0.17	-0.09	0.12	0.35	.66*
High Inductive/High Sensitizing	0.28	.34*	0.12	0.19	-0.12	-0.11
Perceived Cognitive Effects	0.88	.91*	0.09	0.11	0.02	0.09
Perceived Affective Effects	0.39	.65*	0.16	0.18	0.09	-0.05
Perceived Behavioral Effects	-0.02	-0.06	0.37	.78*	-0.10	-0.16
Perceived Significant Impact	0.76	.86*	0.62	.65*	-0.09	-0.14
Perceived Insignificant Impact	-0.09	-0.19	-0.08	-0.17	0.21	.27*
Parental Dyad	0.85	.94*	-0.05	-0.09	-0.12	0.17
Mother as Mediator	0.11	0.09	0.04	0.08	0.23	.37*
Father as Mediator	-0.02	-0.07	0.55	.67*	0.29	.42*
Redundancy Coefficients	[.03]	[.12]	[.06]	[.10]	[.04]	[.03]
Set 3: Child Attributes						
Intellectually Gifted	0.77	.91*	0.07	0.13	0.17	.37*
Academically Average	0.03	0.09	0.37	.64*	0.72	.86*
High Consumer	-0.04	-0.12	0.57	.89*	0.49	.82*
Moderate Consumer	0.14	.28*	0.46	.66*	0.17	0.14
Low Consumer	0.81	.87*	-0.11	-0.17	-0.07	-0.09
Male	-0.03	-0.11	0.12	0.19	0.62	.92*
Female	0.76	.93*	0.05	0.12	-0.13	-0.16
Redundancy Coefficients	[.05]	[.14]	[.04]	[.08]	[.04]	[.02]

Note: Root 1: Rc = .44, eigenvalue = .18, x2(139) = 122.34, p<.001; Root 2: Rc = .51, eigenvalue = .26, x2(167) = 154.32, p<.001; Root 3: Rc = .67, eigenvalue = .42, x2(282) = 254.37, p<.001; *p<.001

This root would seem to identify the type of household **most likely** to utilize TV ratings information in the mediation of their children's televiewing—parental dyads, who, collectively, employ a highly inductive style of child rearing (partially supporting hypothesis 1), employ a highly evaluative method of mediation (supporting hypothesis 2), believe that television can have significant positive and/or negative effects on children (supporting hypothesis 4), and are

more concerned with cognitive- and affective-level effects than behavioral-level effects (supporting hypothesis 6). In addition, parents most likely to utilize TV ratings information in their evaluative mediation are also more likely to have an intellectually gifted child (supporting hypotheses 7 and 8). Interestingly, these high mediators are also likely to have children who are moderate or low consumers of television. This does not lend support for Hypothesis 9, which predicted that high mediators would have children who were high consumers of television. These children are also more likely to be female (supporting hypothesis 10).

The second canonical root (Rc = .51) explained 25.7% of the variance in common between the canonical variates. Set 1 depicts a positive relationship between Restrictive mediation and a moderate level of mediation. Set 2 indicates positive association among parents' perceptions of behavioral-level effects, perceptions of television's significant impact, high sensitization/low inductive child rearing practices, and fathers as primary mediators. Set 3 reflects a positive association between children with learning disabilities, academically average children, and high and moderate levels of television consumption.

This root would seem to reflect parents with a **moderate likelihood** of utilizing TV ratings information in their mediation of their children's televiewing—a father (supporting hypothesis 11) who typically disciplines through physical punishment and/or the deprivation of material objects or privileges, including more restrictive methods of television mediation (supporting hypothesis 3). This type of parent believes that television can have significant positive and/or negative effects on children (supporting hypothesis 4), and is more concerned with behavioral-level effects than cognitive- or affective-level effects (supporting hypothesis 5). Parents of academically average children tend to use the ratings information in more restrictive methods of television mediation (supporting hypothesis 8). Unexpectedly, these children also tend to be moderate or high consumers of television. This, along with the structure coefficients of the first canonical root, does not support hypothesis 9 which predicted that high TV consumption by children would be associated with a high level of mediation by parents.

The third canonical root (Rc = .67) explained 42.1% of the variance in common between the canonical variates. Set 1 depicts a positive relationship between Unfocused mediation and a low level of mediation, as well as a negative association between Unfocused mediation, other forms of mediation, and a high level of mediation. Set 2 indicates positive associations among parents' perceptions of no significant impact of television, low inductive/low sensitization child rearing practices, and fathers or mothers as the primary mediator. Set 3 reflects a positive association between academically average children, high levels of television consumption, and male gender.

This root would seem to identify the type of parents **least likely** to utilize TV ratings information in their mediation of their children's televiewing. These parents tend to be either mothers or fathers who exhibit little explicit supervision or direct discipline when engaging in child rearing in general and television media-

tion in particular. When mediation does occur, it tends to be highly unfocused in nature. This is in line with the expectations posited in the first set of hypotheses, which predicted that parents with more inductive and sensitizing child rearing practices would employ the ratings in more evaluative and restrictive mediation strategies, respectively. The profile of the parent least likely to utilize TV ratings also includes a perception that television does not necessarily have significant positive and/or negative effects on children (which supports hypothesis 4), despite the fact that their children tend to be the heaviest consumers of television (which does not support hypothesis 9). In addition, boys who are academically average are more likely to have parents who are unfocused, low mediators than are academically average girls (which supports hypothesis 10).

Discussion

To date, the MPAA television advisory system has not been a resounding success. Just over a third (34.7%) of parents were reported using the age-based rating system to guide their children's viewing (Bash, 1997; Mifflin, 1997) and many parents found the ratings counter-productive to decision-making (Cantor & Harrison, 1996; Kremar & Cantor, 1997) and relatively useless (Greenberg, Rampoldi-Hnilo, & Ver Steeg, 1998). Critics have begun second-guessing the Telecommunications Act provision to empower parents with ratings information to keep inappropriate programming from reaching their children. They are now wondering whether the newly revamped system with content coding and the forthcoming V-chip technology are wasted efforts (see Aversa, 1997; Fleming, 1997a) as well.

This investigation confirms the finding that a relatively small proportion of parents actively incorporate TV ratings into their mediation of television. In addition, by profiling the types of parents most likely to use the ratings in their decision-making and the manner by which ratings are incorporated into rules and regulations about television in the home, this investigation suggests that the MPAA has also been preaching to the choir. Those parents in the least need of mediation assistance are the ones most likely to be using the ratings information. These mothers and fathers work in tandem when creating and enforcing rules about television, interact frequently with their children, use reasoning, explanation, and appeals to the child's pride and achievement as disciplinary techniques, and exert little external power over their children. According to the self-reports employed in this investigation, these parents use the ratings information in their discussions about TV with their children; children who tend to be in the least need of this information. The children of these high mediators were low-to-moderate consumers of television, intellectually gifted, and primarily female.

When considering the new ratings with content-specific information, which were implemented in the Summer of 1997, it would seem likely that they would be used by the same audience in the same manner as the age-based ratings—as fodder for discussion when planning to watch or while watching television. When the availability of the V-chip becomes a reality, it would seem unlikely

that these highly inductive/low sensitizing parents would use this technology to block programming from their children. Such restrictive mediation is uncharacteristic of parents of intellectually gifted children. It will be interesting to see if the V-chip is used by the children themselves in their televiewing decision-making.

This investigation also suggests that those parents and children in greatest need of ratings information to guide televiewing in the home are the least likely to use it. These parents, typically mothers or fathers creating and enforcing rules about television without the input of another parent, tend to exhibit little explicit supervision or direct discipline when engaging in child rearing in general and television mediation in particular. They tend to believe that television does not necessarily have significant positive or negative effects on children. They also tend to constitute the greatest proportion of the sample. When mediation is enacted by these parents, it tends to be highly unfocused. Contrary to predictions, the children of these low mediators are the heaviest consumers of television in the sample. They also tend to be boys.

It would seem unlikely that the simple addition of content-specific information to the age-based ratings would be sufficient to modify an unfocused mediation strategy deeply rooted in low inductive/low sensitizing child rearing practices. Consequently, it is unlikely that the new rating system will have any significant impact on this segment of the population. Although V-chip technology would provide a simple, more direct method of mediation for parents, one would expect that it, too, would be largely ignored by these parents.

The findings in this investigation that pertain to gifted children and their parents are particularly engaging and raise several questions for future research. According to Meckstroth (1992, p. 91):

> Issues for families of gifted children are complex and intense. Indeed, the process of recognizing qualities of giftedness in a child evokes a range of responses in families affecting the roles and relationships of an entire family system as the whole family constellation shifts to accommodate a child's giftedness, and each family member's reactions differ because of their own particular temperament, personality, interests, and abilities.

Although this investigation found that parents of gifted children employed the TV ratings in a highly consistent manner—that is, through frequent parent/child interaction, the use of reasoning, and explanation rather than more restrictive methods of intervention—there is little insight as to whether this strategy was used for all family members. Are mediation strategies different for gifted and non-gifted children in the same household? Clearly, further investigation is required.

Another question that should be addressed in future research is whether parents respond to their children's traits, aptitudes, and behaviors when devising television mediation strategies or reflect on their own characteristics as adults. Neisser, Boodoo, Bouchard, Boykin, Brody, Ceci, Halpern, Loehlin, Perloff, Sternberg, and Urbina (1996) suggested that, "like every trait, intelligence is the

joint product of genetic and environmental influences" (p. 96). Perhaps the unique characteristics of intellectually gifted children, such as problem-solving ability, high internal control, and abstract thinking (see Frasier, Hunsaker, Lee, Mitchell, Cramond, Krisel, Garcia, Martin, Frank, & Finley, 1995) are shared by parents. How might this allow us to best predict parental mediation strategies and the potential use of the new ratings with content-specific information and V-chip technology?

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Childhood Sibling Relationships of Eminent Canadian Women

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Sibling relationships within the childhood families of 144 eminent Canadian women are described in this exploratory study into perceived closeness with the sibship. The factors that influenced the closeness of the relationship were sought using thematic analysis of the women's reflections on their childhood. Half of the sample experienced close sibling relationships; half did not. Those who felt close to at least one of their siblings often expressed their own responsibility as well as rivalry within the sibship. Those who did not feel close to their brothers or sisters often blamed the age difference among the children, the perceived favoritism of one child by the parents, and the feeling of the gifted girl of being alone, special, or different. A developmental change in relationships over time was noted, particularly by those women who were not closely bonded to their siblings in childhood.

Despite the fact that eminence has been researched since the time of Galton (1869), the study of eminence among women is a recent focus (Kass-Simon & Farnes, 1990), and the investigation of sibling relationships within the family of origin is a largely unresearched area in the study of these highly successful adults. Most researchers who have studied relationships within the families of the gifted have tended to overlook the relationships among the siblings and concentrated on the relationship of the parents with their gifted child (Cornell, 1984; Hennig, 1973; Ross, 1979). Other studies of special populations have referred to sibling relationships, but not among eminents-to-be (Feldman with Goldsmith, 1986; Gath, 1992; McHale & Harris, 1992). Although there have been few studies of sibling relationships among eminent adults (with the notable exception of Wallace, 1990), interpersonal relationships have been mentioned in some studies of eminence (Goertzel & Goertzel, 1962; Hennig, 1973; Kerr, 1985). Simonton (1992) found 2% of scientists and inventors to have equally eminent siblings.

Sibship is the term used to describe the set of siblings within the family, the children who share the childhood home. The early years of sibling socialization influence many aspects of development. Both Piaget and Anna Freud pointed out the importance of siblings in the development of moral judgment and social understanding (Dunn, 1985). Brothers and sisters continually compare themselves to each other as they seek to establish their own emerging identities (Bank & Kahn, 1982).

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There are many factors that affect how much influence one sibling has on another. Toman (1993) believed that a person generalizes experiences within the family to the other social situations that are encountered. The configuration of the siblings according to rank and sex has a predicable effect on the personality of those included. The availability of the parents and the amount of time the siblings spend in each other's company are two potential components (Bank, 1992). The sibling relationship is also influenced by the sibling position within the family constellation and by each of the dyadic relationships between all family members. Competition occurs naturally within the family setting, as children seek to obtain and share the parental attention available. When there are no siblings, an only child compensates by forming close relationships with the parents (Falbo, 1992).

Little is understood about how the giftedness of a family member affects the various relationships among the family members. Growing up in a home in which only one of the children is gifted can be a very negative experience for the other children. Having a gifted child can place more pressure on the family system, increasing the amount of competition and rivalry among siblings and reducing the individual worth of the other children (Cornell, 1984; Grenier, 1983; Ross, 1979). Gifted children demand more, sleep less, are more curious, and may drain the parents of time and energy (Clark, 1992).

This study presented a unique opportunity to delve into the relational phenomenology of the childhood homes of eminent women. The purpose of the work was to establish the extent to which, as children, eminent women felt close to their brothers and sisters. Of special interest was the question of how differences that are attributable to the presence of giftedness within the family affected the attainment of success by these women.

Given the lack of background studies on childhood sibling relationships of eminent people, male or female (Wallace, 1990), this study was intended as an exploratory investigation. The renown and achievements of the participants implied an ability to relate positively with others. From this point of view, one would expect close childhood sibling relationships. On the other hand, studies of sibling relationships in general have pointed to the rivalry within the family for parental attention as part of the development of identity. The brothers and sisters of these girls might have felt a great deal of jealousy of their sisters' achievements. Cornell (1984) portrayed the siblings of gifted children as being less adjusted emotionally and having lower status within the family dynamics. This point of view is suggestive of a distant relationship among the sibship, complicated by the superior abilities of the eminent-to-be. A naturalistic research paradigm with the flexibility to permit investigation of diverse manifestations of a particular variable was chosen to explore the research question: What was the nature of the childhood sibling relationships of eminent women?

Method

Subjects

All of the women listed in the *Who's Who of Canadian Women* (Pasternak, 1986) who could be reached by mail (n = 1553) were contacted initially in a study by Yewchuk, Chatterton, and Jackson (1990). These well-known women were recognized for their exceptional achievement in all facets of public life: politics, sports, the arts, education, literature, journalism, the professions and so on. While the majority had recognizable national profiles, some were household names in particular regions of the country.

In this follow-up study, the 430 women (of the total group of 827 respondents to the initial contact) who indicated an interest in being involved in further study were surveyed about their family backgrounds. One hundred and ninety-seven responded, representing a 46% response rate; of these, 29 had no siblings and 24 others with siblings did not respond to the question about relationship, leaving a sample size of 144.

Subjects ranged in age from 29 to 71 and the average age of the respondents was 47.3 years with a standard deviation of 9.5. The modal age was 42 and the median was 45.5 years. Nearly half (45%) of the women were in the first birth position in their families. Twenty-one of the laterborns had a space of five or more years between themselves and the next oldest sibling. Twenty-six percent of the subjects reported having a sibling who also achieved eminence. The modal family size was three children with families ranging in size from two to eleven children.

Instrument

The question used in this analysis was taken from a questionnaire called "A Survey of Childhood Backgrounds of Eminent Women," of which the results pertaining to parental characteristics have been presented elsewhere (Yewchuk & Schlosser, 1995). The question read: "Try to describe the basic relationship between you and your siblings while children. Describe how you were treated and what place you held in the sibling group (e.g., a recipient of jealousy, friendliness, little attention or a loner, a mothering role, joker . . .). Was there a close connection with any sibling?"

Procedure

This retrospective study of sibling relationships was based on the memories and meanings supplied by the respondents, a common investigational method for studying eminence (Simonton, 1994). The reflections of these eminent women on the relationships experienced during their childhoods provided the data for this study. "In order to grasp or clarify the meaning of an experience, one has to reflect upon it" (Giorgi, 1986, p.13).

The responses of the subjects, gathered into a series of short paragraphs,

were first perused in order to obtain an overview of the material presented. Significant phrases that pertained to the issue of closeness in relationships with siblings were extracted and listed. The subjects' own perception of the amount of closeness in their sibling relationships was used as the basis for categorization into two groups: those who expressed a closeness with at least one of the other children within the sibship, and those who portrayed a lack of closeness with their siblings. This part of the data analysis was based on the interpretive-analytic approach of Svensson (1986), who recommends grouping together phenomena similar in content with their specific content being preserved. The focus is on describing the fundamental characteristics of the phenomena, and comparisons are made between individuals and among groups. Descriptions are concerned with the participants' conceptions of the content of the phenomena being studied and why these differ. In this study, this approach permitted group comparison of the ways the women described their childhood sibling relationships.

After the responses were grouped into those that reflected close and distant sibling relationships, the raw data for these two groups were analyzed separately using the methods described by Strauss and Corbin (1990). Meaning units were identified as the units of analysis. They were paraphrased and coded and the codes were entered into separate windows in a computer word processing program. The codes were then clustered according to content into categories of meaning. In a search for the commonalities or universals underlying the phenomenon of sibling relationships, the categories that emerged (themes) were compared.

The technique used for establishing technical rigor, as explained by Patton (1990), involved the search for rival explanations and negative cases by comparing the themes generated by the two groups (close and not-close). Following a procedure recommended by Denzin (1978), chi-square tests of association were applied to these groups to ascertain significant differences among the emergent themes.

Results

The sibling relationships were categorized into two groups: those having close sibling bonds and those lacking closeness. Half of the women (n=72) referred to their sibling relationships as not being close during their childhood, while the other half (n=72) revealed being close to at least one sibling as children.

The word "close" was used by two-thirds of all respondents. It was assumed that the word was used similarly by all the respondents to connote trust, intimacy, confidentiality, familiarity, or devotion. Other respondents used phrases such as "shared everything," "very attached," "doted on each other," and "idolized him" to express their perceived closeness. Those grouped as not being close to their siblings used phrases such as "did our own thing," "completely separate,"

and "little contact." While some of the respondents used their terminology to describe the family as a whole, most refereed to their own dyadic relationship with one particular sibling.

Group I: Close sibling bonds

Of those with a close relationship, 34 stated that they were close to a brother, and 29 named a sister. The other respondents reported being close to both a brother and sister (n=4), or did not specify which sibling they were close to (n=5). Some of the respondents also specified the sibling order of their closest sibling. Of those who named a brother they were close to, 12 specified that he was a younger brother and 20 said he was an older brother. Of those close to sisters, 13 specified younger ones, 13 named older sisters, and one was a twin sister.

Two themes emerged for those with close sibling relationships: the amount of responsibility that the eminent-to-be had for her siblings (n=35), and the amount of sibling rivalry (n=32).

Responsibility. The theme of responsibility was clearly elucidated by many respondents who used the word "responsible" to describe themselves. It included two subthemes: providing mothering for their siblings, and taking a leadership role within the sibship.

The first subtheme related to the mothering role that the respondent had with her younger sisters and brothers. Twenty-three women referred directly to this role:

> My mother, brother and I were close and I was the "little mother." My mother devoted herself to us and my father didn't return until I was 10. I spent a lot of time with my brother until I was 13. At age 13 my sister was born and I was the "little mother" again and we were very close until I married at age 21. (026)

> My brother and I were very close. He was first my baby, then my charge, and finally my good friend. (118)

The respondents often felt that, as girls, they had assumed a leadership role within their sibships: guiding their brothers and sisters, or influencing their decisions. This second subtheme relating to leadership was expressed by 12 of the respondents:

> I was the older and was expected to provide some form of leadership to my brother. (020).

> I was the dominant sibling and was relied on by others and my parents to take a leadership role (e.g., taking siblings to the dentist, making purchases in a store, buying tickets at the movies). (142)

I also played a leadership role to the three of us, planning what we would do and trying new things. (034)

Sibling rivalry. Despite the closeness expressed by these respondents, there emerged a strong theme of sibling rivalry (n=32). Thre seemed to be an inherent contradiction with rivalry and conflict being expressed by those who characterized their relationships as close, nevertheless, rivalry among the siblings was very much a part of the relationship they shared. The two subthemes involved jealousy and conflict (n=32). There seemed to be an inherent contradiction with rivalry and conflict being expressed by those who characterized their relationships as close; nevertheless, rivalry among the siblings was very much a part of the relationship they shared. The two subthemes involved jealousy and conflict (n=13) and competition arising from ability differences (n=19).

Some of the comments of those who indicated that their close sibling bonds were also marked with fighting and jealousy included:

My siblings were jealous, at least my older sister was. She was also my closest friend. (093)

I had the closest relationship with my oldest sister, who was like a second mother. There was jealousy between my other sister and myself. She resented me because I was the youngest. I resented her as she always lorded it over me that she was older, was prettier, and more popular. My brother was treated as a little god. He used humor to cover over his terrible lack of inner security. We were all very close. (036)

The ability and achievement level of the girls appeared to be a factor in some of the comments subsumed under sibling rivalry, as the following comments indicate:

I was the whiz kid at school. She was smarter—but a rebel and a school dropout. Many years later we realized she had learning disabilities. (027)

My sister and brother fought often but I got along with both. I was the admired achiever. (042).

Group II: Not being close to a sibling

Four distinct themes emerged from the analysis of the reflections of the respondents who expressed their lack of closeness with the other members of the sibship during their childhood. They included the spacing between the children, the interfering effect of the relationships with parents, the difference or loneliness the girl felt from her siblings, and the rivalry and jealousy that resulted from her early success.

Age difference. The theme of not being close to the siblings was sometimes presented as an offshoot of the structure or composition of the family. There

were 22 who believed that they were unable to achieve a closeness to their brothers and sisters because of the age differences among the sibship. Some of the comments included:

> Four years difference meant that we were not particularly close. (010).
> There was a fairly large age gap (6 years between my brother and me, 10 years between my sister and me), thus we all grew up fairly individually until we became teenagers. (061).

> I was born in the U.K after the war. My siblings were all born before the war and were, therefore, considerably older than me. I grew up without much sibling company. (171).

Parental preference. The second theme referred to the interference of the parents in the relationship in some way (n=22). Sibling relationships are not simply dyadic: the role of other family members comes through clearly. Sometimes the eminent-to-be was selected by the parent for special nurturing; sometimes one of the other children was favored. Both situations affected the closeness of the sibling relationship. The two subthemes were the closeness of the eminent-to-be with a parent (n=12), and the favoritism of the parent towards a sibling (n=10).

Those who were extremely close to one of the parents did not seek the confidence of their sibling(s). Eight of the participants reported being especially close to their fathers and four were particularly close to their mothers.

> I was a loner and preferred my mother's company to other children my age. (112)

> [M]y mother worked outside the home, but I was close to my father. (171)

The attitudes of the parents were seen as interfering with sibling relationships. Favoritism on the part of at least one parent was raised as impeding the development of close relationships among siblings. Ten participants expressed their belief that their parents favored another one of their children.

> Relationship with sister not close. She was jealous and resentful. I was resentful. I felt she was mother's favorite. (087).

> We had a terrible, jealous relationship due to our mother's preferential treatment of my sister. (146)

Loneliness. The third theme alluded to a sense that being different led to a feeling of loneliness. Twenty of the respondents who were not close to their siblings described themselves as "loners". These gifted girls may have differentiated themselves from the other children in their sibships. The comments illustrate the effect this distinction had on family relationships.

> Middle 4 children were close friends. I always felt much older, even though we were close in age. (167)
>
> I felt very lonely and tended to play a placating role in conflicts between other members of my family. (017)
>
> There was a lot of aloneness and loneliness (117)

Sibling rivalry. This theme parallels that which emerged in Group I, but without the redeeming feature of closeness between siblings. Thirty-two of the respondents in Group II referred in some way to rivalry as contributing to their distant relationship with siblings. The suggestion in the literature that having a gifted sibling might inspire feelings of inferiority in the other children was evident in the reflections of the eminent. Many of the respondents (n=17) referred to their own abilities as having a negative effect on the sibling relationship. The other subtheme which emerged (n=15) involved jealousy unrelated to ability differences.

The abilities of the eminent-to-be were described as eliciting jealousy in siblings through statements of comparison with a sibling or statements of expectation levels by the family members. Clearly the high level of ability and achievement of the respondents was an issue in the family relationships. Examples of these statements follow:

> He and I were pretty conflictual. He was jealous because I was a goody-goody achiever. (013)
>
> As I was bright, there was jealousy from my middle sister and often I was blamed for things that went wrong. (076)
>
> Because of my superior intellect and academic performance, comparisons were always drawn much to the detriment of my sister. However, the favoritism created a feeling of insecurity in her which still exists. (157)

Jealousy was also experienced in relation to factors other than ability differences within the sibship. Fighting, teasing, and feelings of resentment were common. Fifteen women in this group referred to sibling rivalry of this sort. Sometimes the envy or jealously was based on beauty or personality aspects of the other sibling.

> Intensely competitive relationship with older jealous sister. I was friendly and cute; she was plainer and withdrawn. (066)
>
> There was a lot of competition between us. We fought and argued. (073)
>
> I was mostly dominated and frequently bullied by my one sibling, who was 6 years older. (074)

Change in relationship over time

A separate and incidental theme which emerged within both groups referred to the changing nature of the sibling relationship over time, from childhood to adolescence and adulthood. Closeness was often expressed as being temporally related. Sibling relationships were not always static; in some situations they were subject to change as the children grew and developed.

Fourteen of the women in Group II reported that their relationships became more positive later in life. They reported a lack of closeness with their brothers and sisters in their childhood, but the development of a closer bond as they grew older.

> We weren't friends while young. We are now. (175)

> We are now all three very close to each other. (061)

> I did not care for her (unless an outsider criticized her—then I defended her). She demanded attention and I was quiet. We are very good friends now! (124)

There were four respondents from the close group who believed that their sibling bond was weakened over time. One woman wrote,

> Warm, but close relationship between me and my sibling. Interests and value systems became more and more divergent as we reached adolescence. (168)

The theme of change in the sibling relationship from childhood to adulthood was an unexpected finding, as it had not been referred to at all in the literature on eminence or giftedness. The change in the nature of sibling bonds over the life-span clearly demonstrates the need for developmental approaches in the research into eminence or adult achievement. What holds true in childhood may not necessarily persist into adulthood for these highly successful individuals. Relationships may change as the siblings grow older and increase in their powers of understanding. In their study of 40 children in Cambridge, England, Dunn and Kendrick (1982) noted that there are marked changes in relationships as children progress from preschool to their middle childhood years.

This may have important implications when one or more of the siblings is gifted. The gifted girl is likely to have an increased understanding of relationships earlier than her nongifted siblings. The very bright may be more capable of mature vision in their relationships as well as in other aspects of their lives. The fact that many perceive troubling relationships with their siblings and their parents may be due to their heightened perceptive abilities, rather than families that are troubled in reality. As the following comment shows, the gifted girl did not always perceive of the relationship in the same way that her siblings did: "I was accustomed to playing alone (raised on a farm surrounded by adults) and probably didn't deal very well with my siblings (my oldest sister has some

harsh words for my being overbearing, cruel, etc., but I also remember protecting her and teaching her)" (016).

TABLE 1: COMPARISON OF THEMES FOR GROUP I (CLOSE) AND GROUP II (NOT CLOSE)

Theme	Group		χ^2	p
	I	II	df=1	
Responsibility	35	22	4.9	.03*
Mothering	23	13	3.7	.05*
Leadership	12	9	0.5	.48
Sibling Rivalry	32	32	0	1.00
Jealousy	13	15	0.2	.67
Ability differences	19	17	0.1	.70
Age difference	10	22	5.8	.02*
Parental preference	12	22	3.9	.05*
Loneliness	5	20	10.9	.00**
Change in relationship over time	4	14	6.3	.01*

Note. *p < .05. **p = .001. n = 72 for each group

Comparison of the two groups

In order to establish trustworthiness and rigor, the two groups of respondents were compared for thematic similarities. The possibility of alternative themes was investigated by a thorough search of the data of each group for the theme associated with the other group (Patton, 1990). The respondents classified as close were scrutinized for age difference between the children, parental preference, and loneliness of the girl. Those grouped as not being close to their siblings were searched for the theme of responsibility. The theme of sibling rivalry and the incidental theme of change over time, which had emerged in both groups, were included as well. Differences in frequencies were determined through chi-square analysis. Table 1 provides the results for these comparisons. Significant differences between the two groups were found for all of the themes except sibling rivalry and the subtheme of leadership.

Any approach that seeks to find agreement among the subjects or its participants loses the added flavor that the outliers have to contribute to the findings. There were some cases in this study that are interesting because of their dissimilarity to the rest. The issues of abuse, disconnection from others, and the complexities of twin relationships emerged in these cases. One girl reported abuse at the hands of an older female sibling. The two sets of twins in the study were not alike in their perceptions of their sibling bond. They both mentioned competing with their twin sister for the attention and favor of the parents. The identical twin reported feeling very close to her sister. On the other hand, the non-identical twin did not feel close to anyone in her family. She felt rejected by her parents because of their preference for the other girl and hid her inner self from others.

Discussion

The major contribution of this study lies in its investigation of the sibling relationships in the early socialization of eminent women. Approximately the same number of women perceived their childhood relationships as being close to at least one of their siblings as perceived a lack of closeness to their brothers and sisters. The complexity of sibling relationships is clearly demonstrated by these findings.

Those who were not close described the structure of the family as being an important factor in not making such a relationship available. They also described factors in the family climate as having an effect, such as parental favoritism and differing expectation levels of the parents for individual children. Family dynamics in the form of a special role for the gifted child or her isolation from the rest of the family also emerged in the thematic analysis of the reflections.

Family structure also affected the group of women who did experience a closeness with their siblings. Bank and Kahn (1982) have suggested that having a younger sibling to teach may boost intellectual development. The number of women who referred to their mothering and nurturing role with their siblings is supportive of this theory. Those who were laterborns were also affected by their position within the family structure. A large age space may reduce the amount of comparison and competition within the relationship. The younger girl may be more able to accept the help of the older children and cooperation may increase in this situation. As was pointed out by Grenier (1983), large age gaps are conducive to good sibling relationships. The girls who were the eldest often mothered their younger siblings. In so doing, they experienced early instrumentality and responsibility. The younger girls were the recipient of early nurturing from older siblings that improved their skills.

Competition and comparisons occur within every family. The amount and the kind of these comparisons could be greatly changed in sibling relationships when one of the siblings is perceived to be gifted. Friction and even aggression can be the result of vying for parental attention or strengthening of the child's position within the family (Dreidurs, 1973; Levi, Bushila & Gerzi, 1977). Being gifted and perceiving oneself as being somehow different or special within the family or being differentiated in that manner by the other family member must eventually affect relationships among the sibship (Ross, 1979). The confidence of the gifted individual, her persistence, and independence may draw the favor of the parents and the ire of the siblings (Grenier, 1983). The superior achievement and success of the eminent-to-be was likely to be obvious early especially when she was the firstborn child, and she was firstborn in nearly half of the cases. The special needs of the more capable child may mean that not only the time and energy of the parents, but also their financial resources may be funneled into that one child, rather than being fairly distributed among the children (Cornell, 1984).

In this study childhood sibling rivalry emerged as a dominant theme for the respondents irrespective of whether they reported being close or not close to their siblings as children. In all, 64 (44%) reported experiencing jealousy in siblings and envy of their superior abilities. It is clear that for many of the women, rivalry was an important aspect of their childhood interactions with their siblings. What is not clear, however, is the extent to which the experience of sibling rivalry which is typical of normal family situations (Bank & Kahn, 1982; Boer & Dunn, 1992) was exacerbated (or perhaps ameliorated) by the giftedness of one sibling relative to others. This is an area that bears further empirical investigation.

Toman's (1993) conclusions for girls within their sibling sets are interesting from the point of view of this study. He believed that the older sister of a sister will be domineering; the youngest sister of a set of sisters will be competitive. The older sister of brothers will be independent and strong; the younger sister of brothers will be particularly feminine, looking to her brother(s) for protection and leadership. Toman believes that the sibling effects become more pronounced for a person who has more siblings of the same sex. "The oldest sister of several brothers is usually more caring, more responsible and ready for leadership vis-à-vis men than is the oldest sister of but one brother" (p. 18).

The findings of this study seem to confirm some of the theories of Toman (1993) about female siblings. These women were the eldest in the family in nearly half the cases. Their ability to lead others clearly emerges from their reflections and also from the evidence of their achievement in later life. These girls were responsible and independent at an early age. They assumed adult roles very early in their lives. Their nurturing of their siblings may have been their early experiences with independence that led to their later ascension above their peers in their fields of expertise. The advantage of birth order combined with superior abilities may be precursors to adult attainment.

Kerr (1985) reported that the seven eminent women she studied had an ability to avoid confluence with others that served to isolate them from the demands and sex-roles expectations of others. This study does not confirm her findings. Seventy-two women reported close bonds to their siblings and another 14 expressed the feeling that their relationships became closer later in their lives. It would seem that many of the women in this study did not try to avoid the wishes, demands, and expectations of others. Instead they valued their siblings.

In their five-year study of 100 girls, Brown and Gilligan (1992) focused on the relational lives of the participants and how these changed with adolescence. Students were interviewed in order to obtain more information about women's development in the critical time period between childhood and womanhood. For these subjects, early adolescence was described as a crossroads when some kind of compromise between voice and relationships was reached. There was a tendency for them to dismiss their own experience and modulate their voices to maintain relationships with others. Eight-year-old girls showed a healthy resist-

ance to losing their voice and their real relationships, but by adolescence, they used numerous forms of psychological resistance to dissociate themselves in order to become more like some ideal image of what a woman should be. The results led Brown and Gilligan to conclude that female development is asymmetrical to that of males because of timing discrepancies in the loss of voice and the crisis in relationships. From this perspective, gifted girls might not be expected to report feeling close to their siblings when recalling their adolescent years but might be expected to report close feelings when recalling their childhood years. Our results do not support this prediction. Over time these sibling relationships were reported to become more positive and closer, an idea opposite to that of Brown and Gilligan who described the post-puberty relationships of her participants as becoming more inauthentic.

The responses from the women in the current study demonstrate the significance of parent-child interactions in the relationships among siblings. When parents were not perceived as being fair with the children, there was often a lack of sibling bond. Our findings support those of Boer, Goedhart, and Treffers (1992) that perceived favoritism is correlated with negativity in the sibling relationship.

A number of limitations to this project are acknowledged. The large number of subjects, while excellent for an exploratory study, was too cumbersome for an in-depth look into sibling relationships using qualitative methodology. Case studies would provide richer description of the phenomenon. The family is a difficult entity to study because of the complex and covert nature of the psychological processes involved. Of necessity, this study had to rely solely on the credibility of these women's memories of their childhood relationships. Intervening events and the changing nature of relationships may have colored their recollections.

We understand that early relationships prepare the child for future associations; we do not know how or why this occurs. In addition we cannot anticipate how the individual is going to interpret the relationship. The emphasis in the literature on conflict and hostility among siblings demonstrates that there is more known about these negative aspects of relating than about closeness and affection among siblings. To describe the sibling relationships of these women in terms of rivalry would be to oversimplify them. The overlapping of the themes of rivalry in both groups also indicates that to describe these relationships in terms of closeness only would also be an oversimplification. Each eminent-to-be related to her brothers and sisters in a distinctive and complex way.

The whole area of study involving the family backgrounds of prominent women offers inviting opportunities for original research with practical and theoretical implications. More in-depth study is especially needed in the area of family relationship and the early socialization of eminent women. Of special interest would be intensive work on the association of competition with the closeness of the sibling bond, and the impact of the relationship of the gifted girl with her parents on her relationships with her siblings. Considering the

work of Brown and Gilligan (1992), more research is required in how the relationships of these eminents-to-be changed over the course of their development. Careful systematic study is called for in the validation of our exploratory work in this field.

In addition, an extension of this study to eminent men is indicated. No one, as far as we know, has investigated retrospective accounts of eminent men's childhood relationships with siblings. Are the factors involved in close and not-close childhood sibling relationships for eminent men similar to those we have found for eminent women?

Some of the important findings from this study have interesting implications considering the perceived increased stress on the family unit with the typical family shrinking in size, undergoing a high incidence of marital breakdown, and the use of alternative sources of child care. Accessibility of siblings and how it affects the intensity of the involvement of the children needs to be reassessed. Geographic mobility may increase the chances that the only person a child can turn to is a sibling. Parental separation and divorce can provide a common and binding experience for children.

Eminence, as defined in this study, requires acknowledgement by peers and as such, implies that the eminent person has some ability to impress those peers. According to social learning theory the early relationships within the sibling set are generalized to other relationships outside of the family (Boer & Dunn, 1992). These women did not always feel close to their siblings; but, on the other hand, they did not show a lack of connection either, and for some women the nature of the sibling relationship changed over time. Sibling interaction and interdependence appear subject to multifaceted dimensions of influence. Much work remains to be done in increasing our understanding of the role of sibling dynamics in facilitating gifted girls along the path to exceptional achievement.

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Birth-Order Effects in the Academically Talented

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Abstract

Birth-order position was studied among 828 academically talented students from a national sample collected by the Institute for the Academic Advancement of Youth of Johns Hopkins University. When compared to 1990 U.S. Census Bureau data, this sample was disproportionately composed of first-born students. However, much of this birth-order effect can be explained by the covariate of family size, with small families over-represented among the gifted. First-born students tended to get higher verbal scores on the Secondary School Admissions Test while youngest-born tended to do better in math. Students were administered the Rotter Internal-External Locus of Control Scale, the Rosenberg Self-Esteem Scale, the Multidimensional Perfectionism Scale, the Adjective Check List, the NEO Five Factor Inventory, the Myers-Briggs Type Indicator, and the Brief Symptom Inventory. Except for a mild relationship between birth-order and perfectionistic type, there was no relationship found between birth-order position and personality and adjustment. It is believed that often reported birth-order position effects are strongly related to the covariance of family size.

Putting the Research to Use

Many parents believe that their first-born child is predisposed to be the most academically successful of their children. This research study indicates that birth order may be less important among the gifted than typically believed. It appears that having a small number of children is more related to giftedness than the order of the children that one has.

Of the major personality theorists, Adler (1963) deals most directly with the issue of birth order. Adler believed that the demands of each birth-order position typically, but not inevitably, structure the way the parents treat the child and help define the child's resulting personality. According to Adler, first-borns are sensitized to issues of authority and power, which they attempt to gain through high levels of achievement. During periods of stress they would be more dependent, resulting in greater conformity to the expectations of others. He expected these children to feel hostile, pessimistic, insecure, and more likely to be maladjusted as adults than later-born children. When the first-born is also an

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only-born, Adler expected a preoccupation with being the center of attention that persists into adulthood, producing interpersonal difficulty when this need is unmet. Adler expected middle-born children to be the most ambitious and competitive. They tend toward rebelliousness, have difficulty accepting the role of follower, and are likely to be better adjusted than either first-born or last-born children. Adler expected last-born children to be most likely to experience feelings of inferiority and to be predisposed to alcoholism.

Studies in the General Population

Forer (1977) has described the following personality traits as being characteristic of first-borns: 1) high need for achievement, 2) high responsibility scores, 3) low test anxiety, 4) strong self-discipline, 5) need for approval by others, 6) susceptibility to social pressure, 7) conformity to authority and regulation, and 8) task orientation. Later-borns are more oriented toward social relationships than to fulfilling task demands. In a study of predisposition to Type A behavior pattern among college students, Strube and Ota (1982) discovered that early-born (particularly first-born) students were most likely to be Type A and that this result is exaggerated in large families. In a study of nationally ranked Olympic weight lifters, (Hall, Church, & Stone, 1980) first-borns were characterized by a more external locus-of-control and greater need for achievement.

Ever since Galton (1874), there has been a belief in a link between first-born status and superior intellectual achievement. Mechanisms to explain this relationship have included that first-borns receive greater attention and verbal stimulation (Cohen & Beckwith, 1976; Eysenck & Cookson, 1970; Hodapp & LaVoie, 1976; Jacobs & Moss, 1976; Marjoribanks & Walberg, 1975) and greater pressure to achieve (Sampson, 1962). Pfouts' (1980) research indicates that first-borns achieve at a higher level than second-borns, even when second-borns are more intellectually gifted. Hansson (1979) reports that the academic performance of first-borns is less affected by stressful life events than the performance of later-borns.

It has been clearly shown that there is a negative relationship between the number of sibling and intelligence as measured by IQ. The most important studies demonstrating this relationship were those of almost 100,000 French children (Heuyer, Pieron, Pieron, & Sauvy, 1950; Gille, Henry, Tabah, Sutter, & Bergues, 1954), the study of 400,000 Dutch military inductees (Belmont, 1977), and the studies of more than 70,000 Scottish children (Scottish Council for Research in Education, 1949, 1953). The Scottish studies reported mean IQs of 113 for only children and mean IQs of 91 for families with five children. Middle children had the lowest mean IQ. This same negative relationship between family size and intelligence has also been found in a non-Western culture (Cherian, 1990). Falbo and Richman (1979) report that younger fathers and small family size are related to achievement needs and that when these variables are controlled for, birth order is unrelated to the development of achievement

needs. In virtually all of the large scale studies of birth order, family size, and IQ, the lower the father's social class, the more exaggerated the effect of family size and IQ. Additionally, if birth order is held constant, the larger the number of siblings, the lower the IQ (Heer, 1985).

In a meta-analysis of 74 studies investigating the intellectual ability of only children, Polit and Falbo (1988) concluded that only children were never at a disadvantage to comparison groups in any of the studies. They concluded that there was little difference between only children and first-born or children from two-child families. They did find only children to be at a significant intellectual advantage over later born children and children from large families. They attributed these results to the quality of parent-child interactions in small families.

Schooler (1972, 1973) has been highly critical of the methodology used in many of the birth-order studies, claiming that the finding that early-born achieve at higher levels than later-born is an artifact of socio-economic class, with families of higher social status having fewer children and tending to have a higher proportion of first-born children. While Schooler's concerns about confounding variables appear well-taken, a number of studies which have controlled for socio-economic status (Belmont, 1977; Breland, 1973, 1977; Burton, 1968) have still reported birth-order effects.

While studies by Kohn and Schooler (1969) and Nystul (1974) found no evidence of a relationship between birth order and self-concept, other studies have found that later-born children have less positive self-concepts (Eisenman, 1970; Sears, 1970). Griffore & Bianchi (1984) reported, in a study of more than 2,000 children, that self-concept was highest for boys, but not girls, who were only children. In addition, self-concept was generally lower in middle-born than younger or oldest children. Belmont (1977) reported that, in a large sample of 400,000 Dutch military inductees, only last-born children were at greater risk of being given a psychiatric diagnosis than were first-born.

Zajonc and Markus (1975) and Zajonc (1976) have argued that family size and family spacing are much more important than birth order in creating an environment which fosters intellectual development. Zajonc and Markus believe that, as the number of children in the family increases, the intellectual development of the children decreases. They also found that a similar deterioration of intellectual development occurs as the spacing between children becomes shorter. Some researchers, including Steelman (1985, 1986) and Retherford and Sewell (1991) have strongly criticized what has been called the Zajonc hypothesis or confluence model, claiming that Zajonc has little empirical support and that he has failed to adequately control for socioeconomic status.

Studies with Gifted Samples

Despite the commonly believed link between academic ability and birth order, there have been relatively few studies of birth order and family size in gifted populations. Finlay (1981) investigated birth order in honors and non-

honors groups of college students at a state university. She reported no first-born overrepresentation for males in either group but found first-born females to be significantly over-represented in the honors group. She hypothesized that the gender difference was created by honors males attending more selective private universities while honors females were more likely to attend public schools. In a high school sample identified as gifted and talented, Pulvino and Lupton (1978) discovered that students who were first born and those from small families tended to score even higher on the Terman Concept Master Test than gifted and talented students who were from larger families or were later born.

Studies with Eminent Samples

Clark and Rice (1982) analyzed biographical data of Nobel laureates. Science laurates were overwhelmingly first-born while winners in literature and peace tend to be later-born. Sibships of science winners tend to be smaller than those of non-scientists. The early birth order of science winners is maintained even when sibship size is controlled for through partial correlation. Hilton (1967) reported that 21 of the first 23 United States astronauts were first-borns.

The goals of this study are to assess the roles of birth order and family size in the incidence of giftedness and domains of academic ability. Also, the role of these variables in the personality and adjustment of the gifted will be explored. The original intent was to also address the role of the number of children and socioeconomic status as covariates.

Method

Sample

The sample was composed of a nationally gathered group of 828 academically talented sixth graders participating in the first year of the Developmental Study of Talented Youth (DSTY), a longitudinal study of the intellectual and psychosocial development of acedemically talented youth conducted by the Institute for the Acedemic Advancement of Youth (IAAY), at Johns Hopkins University. The sample is 62.1% male and 85% Caucasian. The only minority group with large representation is Asians who constitute 9.8% of the sample. The parents of the students are overwhelmingly upper-middle class, well educated, and constitute mostly traditional, intact birth families. The sample is relatively homogeneous for social class and level of education. While the relative homogeneity of social class and family education somewhat reduces the ability to generalize, this disadvantage is believed to be outweighed by the minimizing of the multiplicity of extraneous variables which would be found in a more heterogeneous sample. A more detailed breakdown of demographic variables of this sample is presented in Table 1.

TABLE 1: FREQUENCY OF DEMOGRAPHIC VARIABLES FOR THE SAMPLE

Gender		
Female	314	37.9%
Male	514	62.1%
Race/Ethnic		
White	704	85.0%
Asian	81	9.8%
Hispanic	9	1.1%
Black	7	0.9%
American Indian	1	0.1%
Other	18	2.2%
No response	8	1.0%
Native English speaker		
Yes	774	93.5%
No	49	5.9%
No response	5	0.6%
Type(s) of school attended between Kindergarten and 5th Grade		
Public	671	81.0%
Private, non-parochial	220	26.6%
Parochial	93	11.2%
Other	30	3.6%
(Total exceeds 100% due to some students attending multiple types)		
Child Lives With		
Birth mother & birth father	722	87.2%
Birth mother only	53	6.4%
Birth mother & stepfather	29	3.5%
Birth father & stepmother	7	0.8%
Birth father only	2	0.2%
Neither birth parent	10	1.2%
No response	5	0.6%
Parent Deceased		
Father	10	1.2%
Mother	4	0.5%
Father's Occupation		
Business/Law	360	43.5%
Math/Science	254	30.7%
Trades/Skilled & Unskilled	91	11.0%
Helping professions	52	6.3%
Arts & Humanities	38	4.6%
Full-time student	3	0.4%
Homemaker	2	0.2%
Missing or no response	28	3.4%
Mother's Occupation		
Helping professions	311	37.6%
Homemaker	141	17.0%
Business/Law	133	16.1%
Math/Science	88	10.6%
Arts & Humanities	66	8.0%
Trades/Skilled & Unskilled	44	5.3%

continued on next page

Table 1, continued

Full-time student	19	2.3%
Missing or no response	26	3.1%
Father's Education		
Not high school graduate	8	1.0%
High school graduate	40	4.8%
Technical vocational school	36	4.3%
College, less than bachelor's	94	11.4%
Bachelor's	214	25.8%
Master's	187	22.6%
Doctorate	233	28.1%
No response	16	1.9%
Mother's Education		
Not high school graduate	4	0.5%
High school graduate	51	6.2%
Technical vocational school	22	2.7%
College, less than BA	126	15.2%
Bachelor's	286	34.5%
Master's	233	28.1%
Doctorate	92	11.1%
No response	14	1.7%

N = 828

Eligibility for inclusion in this longitudinal study was determined by performance on the Secondary School Admissions Test (SSAT; Educational Testing Service, 1990). Most subjects (71.6%) scored at the 99th percentile or better in mathematics, verbal skills, or both on the SSAT, while the remaining 28.4% scored between the 97th and 99th percentiles. The 99th percentile is the cutoff for eligibility for most IAAY programs, while the 97th percentile is the usual cutoff for gifted education programs in community school programs.

Instruments

Family socioeconomic status (SES) was measured by the Standard International Occupational Prestige Scale (Treiman, 1977), which was applied to the demographic background information provided by the parents. This scale produces an interval score to measure SES which ranges from 2 to 90.

Locus of control was assessed by the Internal-External Locus of Control Scale (Rotter, 1966). The instrument is a unidimensional measure with 23 question pairs and six filler items. Scores range from 0 to 23, with higher scores indicating an external locus of control. Rotter (1966) reported internal consistency (Kuder-Richardson) of .70. Internal locus of control is a predisposition to believe that the individual is responsible for the events which impact him or her, while a person with an external locus of control sees external forces as most responsible (see Lefcourt, 1981; Phares, 1976, for overviews). The literature indicates that locus of control is a relatively stable personality variable; those with an internal locus of control are more likely to experience academic success, and that this instrument is sensitive in measuring individual differences in the construct.

The measure of self-esteem adopted in this study was the Rosenberg Self-Esteem Scale (Rosenberg, 1965). This instrument is the most popular unidimensional measure of global self-esteem (Blascovich & Tomaka, 1991). It is a 10-item four-point Likert scale designed to measure adolescent feelings of self-worth. Higher scores are indicative of higher self-esteem. Fleming and Courtney (1984) have reported internal reliability (Cronbach's alpha) to be .88.

There have been frequent claims that perfectionism is a particularly important variable in the relationship between achievement and adjustment in the gifted (see Parker & Adkins, 1995). The Multidimensional Perfectionism Scale (MPS; Frost, Marten, Lahart, & Rosenblate, 1990) was selected as the measure of perfectionism in this study. It should be noted that there is another instrument with the identical name (Hewitt & Flett, 1991). The MPS used in this study not only yields a total score for perfectionism but also subscale scores (Concern over Mistakes, Personal Standards, Parental Expectations, Parental Criticism, Doubts about Actions, and Organization) derived from the instrument's factor structure. The total score is a linear combination of all subscale scores except for Organization. With a female college student sample from an elite university, the internal reliability of the subscales ranged from .77 to .93. The instrument was highly correlated with one measure of perfectionism and moderately correlated with two others (Frost et al., 1990). A recent study (Parker & Stumpf, 1995) has found this instrument to be psychometrically sound and appropriate for academically talented children. A cluster analysis of this instrument with a large sample of gifted students (Parker, 1997) yielded three clusters, indicating the presence of a healthy perfectionistic group, a dysfunctional perfectionistic group, and a non-perfectionistic group.

The Adjective Check List (ACL; Gough & Heilbrun, 1983) was one of three instruments used to assess broad personality variables. The ACL consists of 300 adjectives commonly used to describe an individual's attributes. Initially developed for observers to describe others, it is often used for self-report. Many scales have been developed for this instrument, the most widely used of which are the 15 need scales (Achievement, Dominance, Endurance, Order, Intraception, Nurturance, Affiliation, Heterosexuality, Exhibitionism, Autonomy, and Deference). Gough and Heilbrun report internal reliability of these 15 scales ranging from .56 to .89.

Another broad-based measure of personality used in this study was the Myers-Briggs Type Indicator (MBTI; Myers & McCaulley, 1985). The MBTI is a forced-choice self-report measure of preferences on four bipolar dimensions that are typically scored dichotomously: extraversion-introversion, sensing-intuition, thinking-feeling, and judging-perception. Combinations of these four dimensions form 16 possible types. These four dimensions can also be measured in the MBTI by continuous scores. A number of studies supporting both the psychometric properties and construct validity of the MBTI have refocused attention on its use in personality research (Carlson, 1985; Hicks, 1984), especially as a way of understanding differences in information processing. In addi-

tion, the close alignment of the MBTI scales with four of the five factors in the five-factor model of personality (McCrae & Costa, 1989; MacDonald, Anderson, Tsagarakis, & Holland, 1994) adds to the usefulness of the test in personality research.

Personality structure was further measured by the NEO-Five Factor Inventory (NEO-FFI; Costa & McCrae, 1992). The NEO-FFI is a 60-item short form of the Revised NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1992) which measures the five domains of the Five Factor Model of personality (Neurosis [N], Extroversion [E], Openness to Experience [O], Agreeableness [A], and Conscientiousness [C]). This instrument, traditionally employed with adults, has recently been demonstrated as appropriate for use with academically talented youth (Parker & Stumpf, 1999). The instrument's manual reports a coefficient alpha for the five scores for adult self-report to range from .68 to .86, and the sample of the current study obtained highly similar reliability results.

Adjustment was measured by the Brief Symptom Inventory (BSI; Derogatis, 1993). The BSI is a shortened version of the Symptom Checklist-90 (SCL-90-R), which was developed from the Hopkins Symptom Checklist. This instrument measures nine symptom constructs: Somatization (SOM), Obsessive-compulsive (O-C), Interpersonal sensitivity (I-S), Depression (DEP), Anxiety (ANX), Hostility (HOS), Phobic Anxiety (PHOB), Paranoid Ideation (PAR), and Psychoticism (PSY) as well as three measures of general adjustment, the most widely used of which is the Global Severity Index (GSI). Elevated scores are indicative of greater maladjustment. Separate norms are available for normal adults, normal adolescents, clinical adults, and clinical adolescents. The normal adolescent norms were produced by sampling 2,408 non-institutionalized adolescents between the ages of 13 to 19 and formed the comparison group for the present study. Internal reliability of the subscales as measured by Cronbach's alpha is reported in the manual (Derogatis, 1993) from a low of .71 (Psychoticism) to a high of .85 (Depression). The BSI has been judged to be among the best instruments of its type (Edwards, Yarvis, Mueller, Zingale, & Wagman, 1978; Waskow & Parloff, 1975) and has been widely used in psychiatric research and clinical screening for maladjustment.

Results

The frequency of birth-order positions and the number of children per family from the DSTY (gifted) sample were compared to expectations for the general population based upon the 1990 census (United States Bureau of the Census, 1993). Percentage representations of both groups for the variables are presented in Table 2. The chi-square goodness-of-fit test for birth-order position using the census results as expectations yielded a $\chi^2 = 109.84$ ($df = 3$, $p < .000$). Using Cohen's ω (Cohen, 1977) as a measure of effect size, $\omega = .36$, indicating a moderate difference in the distribution of birth-order position than would be expected from the general population. There is a tendency for the gifted to be first-

born (64.9% vs. 51.5%), but surprisingly the percentage of only-borns was greater in the general population. In comparison, family size yielded a $\chi^2 = 22.46$ ($df = 5$; $p < .00$) with a $\omega = .22$ indicating a small difference. This difference is a tendency for the gifted to come from smaller families.

TABLE 2:
A COMPARISON OF BIRTH-ORDER POSITION AND NUMBER OF CHILDREN PER FAMILY BETWEEN THE DSTY SAMPLE AND US CENSUS DATA

	DSTY	Census
Birth-Order		
Only	16.1%	19.6%
Oldest	48.8%	31.9%
Middle	12.6%	16.5%
Youngest	22.6%	31.9%
Number of Children		
1	16.1%	19.6%
2	49.9%	40.8%
3	24.3%	24.5%
4	7.2%	9.5%
5	1.7%	3.4%
>5	0.8%	2.2%

DSTY $N = 828$
$\chi^2 = 109.84$ ($df = 3, p < .000, \omega = .36$)
$\chi^2 = 22.46$ ($df = 5, p < .001, \omega = .22$)

There are discrepancies in sample size between the instruments since, as part of the DTSY data collection, not all subjects were administered all instruments. Which instruments were administered to a given student was randomly determined. Chi-square analyses indicated that there were no statistically significant differences in the distribution of birth-order positions across the various instruments. The means and standard deviations of these students on the various instruments tabulated by birth-order position are presented in Table 3.

TABLE 3:
MEANS AND STANDARD DEVIATIONS OF SELF REPORTS ON THE SSAT, ROTTER SCALE, ROSENBERG SCALE, MPS, NEO-FFI, ACL, MBTI, AND BSI BY BIRTH ORDER

	Only		Oldest		Middle		Youngest	
Instrument	Mean	SD	Mean	SD	Mean	SD	Mean	SD
SSAT								
Math	296.83	18.48	298.59	16.95	301.53	16.15	300.20	17.17
Verbal	297.99	16.89	295.09	16.60	292.98	18.41	292.12	14.88
Rotter	9.94	4.46	8.98	4.04	8.39	3.63	9.42	4.01
Rosenberg	34.27	4.65	34.06	4.41	33.46	4.24	33.83	4.00
MPS								
CM	18.86	6.47	18.39	5.82	18.05	5.91	17.78	5.07
PS	24.37	4.81	23.52	4.51	23.06	4.15	22.92	4.56
PE	13.88	4.22	13.74	3.83	14.08	4.17	13.45	3.99
PC	7.08	3.22	6.76	2.66	7.07	3.03	6.96	2.60
D	8.84	2.81	8.96	3.00	9.02	2.85	9.08	2.53
O	22.11	5.35	21.64	5.17	21.00	5.26	21.03	5.62
Total	73.03	14.48	71.36	14.03	71.28	14.55	70.18	13.04
NEO-FFI								
N	20.28	7.30	20.48	8.18	19.30	6.36	18.43	7.23
E	30.83	6.36	31.21	6.53	32.10	6.52	31.50	6.08
O	27.53	6.36	26.54	5.81	27.43	5.78	26.95	5.52
A	29.38	5.66	30.02	5.90	31.32	6.23	30.96	5.25
C	30.49	7.84	29.87	7.24	30.28	8.22	30.34	7.27
ACL								
Ach	50.63	7.46	51.18	8.25	52.57	6.11	51.98	7.22
Dom	54.00	7.77	53.69	7.58	53.78	6.23	54.46	6.64
End	49.25	8.44	49.59	8.53	50.61	7.85	50.35	8.33
Ord	47.77	8.43	47.52	8.37	48.76	8.45	48.06	8.50
Int	48.62	8.76	48.52	9.23	48.46	7.39	50.51	7.90
Nur	50.51	9.75	50.83	8.99	51.70	8.65	51.79	9.31
Aff	50.33	8.98	51.48	9.31	53.45	7.86	52.97	8.09
Het	52.69	7.96	52.36	8.52	52.18	9.54	53.69	8.57
Exh	56.70	8.79	56.53	7.87	55.55	9.31	56.35	6.66
Aut	51.53	9.16	51.13	7.75	50.85	8.30	50.98	8.03
Agg	54.13	9.09	53.75	9.21	53.11	9.02	52.71	7.88
Cha	50.81	7.66	51.52	7.18	51.06	8.31	52.14	7.45
Suc	45.96	8.98	46.31	8.21	43.35	6.92	44.09	7.73
Aba	45.79	9.60	46.53	8.05	45.63	7.66	45.09	7.49
Def	46.82	10.63	47.18	9.02	48.24	8.98	47.40	8.71

Table 3, continued

	Only		Oldest		Middle		Youngest	
Instrument	Mean	SD	Mean	SD	Mean	SD	Mean	SD
MBTI								
E-I	96.00	27.78	92.64	25.84	97.94	25.93	91.05	24.17
S-N	117.70	23.70	117.00	21.99	113.03	24.85	117.81	20.84
T-F	88.81	24.83	91.35	22.31	88.50	24.43	88.33	21.93
J-P								
	116.48	27.30	113.48	29.82	112.03	32.40	116.65	24.69
BSI								
SOM	46.85	7.91	45.08	6.18	45.93	8.15	45.44	6.95
OC	48.58	10.31	47.93	8.83	48.77	7.78	49.39	8.11
IS	49.76	11.39	47.56	9.10	46.18	9.26	46.50	7.01
DEP	48.44	11.14	45.81	7.52	44.40	7.73	45.66	5.85
ANX	47.65	10.00	45.97	6.89	45.67	7.25	46.08	5.95
HOS	48.09	10.39	48.64	9.53	48.06	7.92	47.88	7.74
PHOB	45.62	6.87	45.20	6.60	43.58	3.34	45.11	5.31
PAR	46.27	8.50	45.59	8.37	43.61	7.29	45.98	8.56
PSY	46.08	8.70	45.56	6.68	45.80	8.36	45.37	6.91
GSI								
	46.88	10.39	45.49	7.57	44.84	7.06	45.50	6.57

SSAT M N = 827 (NONLY= 133, NOLDEST=403, NMIDDLE= 104, NYOUNGEST= 187); SSAT V N = 828 NONLY= 133, NOLDEST=404, NMIDDLE= 104, NYOUNGEST= 187); Rotter N = 589 (NONLY= 93, NOLDEST=296, NMIDDLE= 59, NYOUNGEST= 141); Rosenberg N = 797 (NONLY= 127, NOLDEST=396, NMIDDLE= 96, NYOUNGEST= 178); MPS N = 815 (NONLY= 132, NOLDEST=401, NMIDDLE= 100, NYOUNGEST= 182); NEO-FFI N = 593 (NONLY= 95, NOLDEST= 297, NMIDDLE= 60, NYOUNGEST= 141); ACL N = 574 (NONLY= 92, NOLDEST= 287, NMIDDLE= 58, NYOUNGEST= 137); MBTI N = 334 (NONLY= 54, NOLDEST= 167, NMIDDLE= 32, NYOUNGEST= 80); BSI N = 323 (NONLY= 50, , NOLDEST=165, NMIDDLE= 34, NYOUNGEST= 74)

The investigator began this analysis with the belief that a significant component of the birth-order effects typically reported was an artifact of the confounding variables of family size and socioeconomic status. Family size was defined as number of children living in the home, not restricted to full siblings. The families were overwhelmingly upper-middle class, displaying relatively little variance and rendering SES of little value as a covariate in the present study.

A multivariate analysis of variance (MANOVA) of SSAT Math and Verbal scores by birth-order position (defined as the four groups: only, oldest not only, middle, and youngest) was conducted. A Wilks' lambda of .97 was obtained with approximate $F(6,1646) = 3.83$ ($p = .001$). Follow-up univariate F tests indicated that verbal scores were related to birth-order position ($F[3,823] = 3.71$; $p = .01$) while math scores were not ($F[3,823] = 1.84$; $p = .14$). A reanalysis of these same data using a MANCOVA with the number of children in the family as the covariate yielded a Wilks' lambda of .98 with an approximate $F(6,1646) = 3.01$ ($p = .006$). Follow-up univariate F tests of the MANCOVA demonstrated that when family size is controlled for statistically, neither SSAT Math scores ($F[3,823] = 2.43$; $p = .06$) nor Verbal scores ($F[3,823] = 2.12$; $p = .010$) demonstrated statistically significant differences by birth-order position.

A one-way analysis of variance assessing the impact of birth-order position on Rotter locus of control scores yielded no statistically significant difference ($F[3,585] = 2.23$; $p = .08$). When family size was added as a covariate to the model, comparable results were obtained ($F[3,584] = 2.15$; $p = .10$). When the same analyses were conducted with the Rosenberg scale, neither the simple one-way model ($F[3,793] = .77$; $p = .51$) nor the model with the covariate ($F[3,792] = .54$; $p = .68$) yielded statistically significant resullts.

A multivariate analysis of variance of subscales on the Multidimensional Perfectionism Scale produced a Wilks' = .98 with an approximate $F(18,2280.2) = 1.11$ ($p = .33$). When this analysis was rerun with the covariate of family size, statistically non-significant results were obtained again ($\Lambda = .98$, approximate $F[18,2277.4] = .85$, $p = .64$). When birth-order position was cross-tabulated with perfectionistic type (Parker, 1997) a $\chi^2 = 12.71$ ($df = 6$, $p = .05$) was produced. Cohen's ω equaled .13, indicative of a mild relationship. To determine if this was an artifact of family size, a similar analysis was conducted cross-tabulating perfectionistic type with family size. This analysis produced a $\chi^2 = 11.24$ ($df = 8$, $p = .19$). The percentage distribution of perfectionistic types by both birth order and family size is presented in Table 4.

TABLE 4:
CROSS-TABULATION OF PERFECTIONISTIC TYPE WITH BIRTH ORDER AND FAMILY SIZE

Birth Order	Non Perfectionistic	Healthy Perfectionistic	Dysfunctional Perfectionistic
Only	26 (20.6%)	60 (47.6%)	40 (31.7%)
Oldest	111 (29.1%)	161 (42.1%)	110 (28.8%)
Middle	28 (28.6%)	43 (43.9%)	27 (27.6%)
Youngest	68 (38.6%)	70 (39.8%)	38 (21.6%)
No. of children			
1	26 (20.6%)	60 (47.6%)	40 (31.7%)
2	125 (32.0%)	157 (40.2%)	109 (27.9%)
3	54 (28.6%)	89 (47.1%)	46 (24.3%)
4	19 (33.3%)	22 (38.6%)	16 (28.1%)
>4	9 (47.4%)	6 (31.6%)	4 (21.1%)

$N = 782$

The more global measures of personality and adjustment failed to detect any statistically significant differences in birth-order position. A MANOVA of the ACL yielded a Wilks' = .91 (approximate F[45,1652.51] = 1.13; p = .25). Similar results were obtained on the MBTI (Λ = .98; approximate F(12,854.87) = .52; p = .91), the NEO-FFI (Λ = .97; approximate F[15,16112.57] = 1.17; p = .29) and the BSI (Λ = .90; approximate F[30,910.59] = 1.15; p = .27). When MANCOVAs were run using family size as a covariate the MANCOVAs were also not statistically significant (Λ^{ACL} = .93; Λ^{MBTI} = .95; $\Lambda^{NEO\text{-}FFI}$ = .97; Λ^{BSI} = .91).

Discussion

The most striking result was the fairly consistent absence of birth-order effects on personality and adjustment. The Rotter Internal-External Locus of Control Scale, the Rosenberg Self-Esteem Scale, the Adjective Check List, the NEO Five-Factor Inventory, the Myers-Briggs Type Indicator, and the Brief Symptom Inventory all failed to demonstrate the influence of birth-order effects. The investigator's expectation was that these instruments would yield significant results which would evaporate, or at least significantly diminish, when covaried with family size and family SES. The relative homogeneity of SES in this sample, characterized by relative affluence, negated the ability to asses the role of SES as a covariate in birth-order effects. However, rather than analysis of covariance with family size as the covariate erasing the effects, few effects were demonstrated at all.

The results suggest that in this Talent Search sample, first-born children are over-represented when compared to census data. Much, but not all, of this relationship can be seen as a function of the covariation of family size. To explain the role of covariation, an example from lung cancer research may be instructive. If one were to examine the relationship between coffee drinking and lung cancer a moderately strong relationship would be found. However, coffee drinking has no causal relationship with lung cancer. Rather, heavy cigarette smokers tend to be heavy coffee drinkers as well. This covariation produces accurate but potentially misleading results. In the present case, the fewer children in a family, the higher the percentage of first-born (e.g., half of all two-child families are accounted for by first-born but only one-third of three-child families). Hence, measurements of birth-order position may be actually indirectly measuring family size, much like heavy coffee drinking may be indirectly measuring cigarette smoking. In the present case, when family size is controlled for statistically by analysis of covariance, approximately two-thirds of the predisposition of first-born children to be over-represented among the Talent Search disappears. This indicates that family size plays a greater role than birth order per se.

When adjusted for family size, math and verbal achievement scores were related to birth older with first-borns most likely to be verbally talented and later-borns more likely to have higher mathematical achievement. It is striking

that this relationship is in the opposite direction from what has been previously reported by Clark and Rice (1982) in their study of Nobel Prize winners. Whatever the cause of this surprising result, the effect size of the relationship between birth order and type of giftedness was quite low, with birth order explaining a minimal 2% to 3% of the variance in types of scores in a gifted sample.

Somewhat mixed results were obtained with the Multidimensional Perfectionsim Scale. Multivariate analysis of variance, both with and without covariates, was non-significant for birth-order effects. However, when analyzed by type of perfectionism, a mild relationship was found independent of family size. The source of this statistically significant relationship is that youngest children are disproportionately non-perfectionists and disproportionately likely to be functional perfectionists. Based on the modest magnitude of this result, replication with another gifted sample or with a more typical sample would be needed before it could be comfortably asserted that the results are not a statistical artifact.

It should be kept in mind that this sample is somewhat atypical of the general gifted population. Not only have these children already scored well on a measure of academic ability or achievement within their own school, but they must then become aware of the Talent Search, be motivated to participate, and have parents either able to afford the application fees or parents who are willing to request a fee waiver. This set of conditions likely was related to the restricted variance of SES in this sample. Additional research with gifted samples with greater variability of SES would allow one to determine the relative role of SES in giftedness as well as the generalizability of the present results beyond the Talent Search population to the broader gifted population.

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Families of Gifted Children in Taiwan:
A Comparative Review of the Literature

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Abstract

Families have a tremendous influence on the development of gifted and talented children. In this paper we reviewed research conducted in Taiwan on families of gifted children and compared the findings to those from studies conducted in the United States in five categories: family structure, family values, family relationships, family stressors related to giftedness, and relationships with other systems. Several cultural differences were highlighted by the review. For example, Taiwanese parents appeared more likely than American parents to attribute their children's successes and failure to effort, to control their children's academic and career choices, and to value good grades and high scores on exams to the exclusion of other aspects of talent development. American parents, on the other hand, appeared more likely to advocate for more effective gifted programming on behalf of their children and to be more encouraging of the development of creative talents in their children. Implications of the review for research and practice with families of gifted and talented children in Taiwan are discussed.

Families are influential in facilitating gifted children's intellectual, emotional, and social development (Moon & Hall, 1998) and are one of the most important systems in the talent development process (Bloom, 1985; Feldman & Goldsmith, 1986; Jenkins-Friedman, 1991; Moon, Jurich, & Feldhusen, 1998; Olzsewski, Kulieke, & Buescher, 1987). However, studies of families of the gifted are comparatively rare and often have been narrow in focus. In the United States, most studies have been limited to an examination of the impact of isolated variables on families of Caucasian gifted children (Moon, Jurich, & Feldhusen, 1998). In Taiwan, most studies have focused on the effects of parenting style on gifted children's academic performance. The purposes of this paper were (a) to review research findings on the characteristics of families of gifted children in Taiwan, (b) to compare these finding with the literature on families of gifted children in the United States, and (c) to discuss implications of the review for future research and practice with families of gifted children in Taiwan.

Comparison of Characteristics of Families of Gifted Children in Taiwan and the United States

The important role that the family plays in the development of children's tal-

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ents and the realization of children's potential is evident in many studies of gifted children in the United States (e.g., Kulieke & Olszewski-Kubilius, 1989; Olszewski, Kulieke, & Buescher, 1987). However, few studies have examined the special characteristics of families of gifted children in Taiwan. In this section, we will review major findings related to families of gifted children in Taiwan and compare them to findings related to families of gifted children in the United States in five areas: family structure and demographics (e.g., socioeconomic status [SES], parental education, and family size), family values, family relationships, family stressors, and relationships with other systems.

Family Structure and Demographics

Taiwan. In a study of 99 gifted and 104 average children in Taiwan, Lee (1973) found that gifted children were more likely to come from nuclear families (84% vs. 53%), have a higher SES background (81% vs. 42% were middle or high SES), and have fathers who were better educated (76% vs. 32% of fathers had college or above degrees) and hold professional jobs (64% vs. 21% of fathers were managers or high professionals). Chien and Lo (1989) also found more families of gifted children had higher SES (40% vs. 20% were 0.5 SD above the mean) than families of average children.

Interestingly, the literature is mixed on the relationship between SES and gifted children's achievement. Some research has supported a positive correlation between SES and achievement (Chien & Tsai, 1991; Kuo, 1994; Lin, 1982); two studies supported a negative correlation (Liu, 1981; Tsai, 1994); and other researchers found no correlation between SES and achievement (Liao, 1991; Lin, 1976; Liu, 1994). Whether disadvantaged environments enhance task commitment or only children with strong task commitment are able to overcome negative environmental effects is still unclear. Another interesting finding is that most gifted children in Taiwan have a full-time mother (Tsai, 1994).

The United States. Gifted children in the United States seem to come from smaller families and are more likely to be first-born or only children (Olszewski, Kulieke, & Buescher, 1987). Many come from a middle-class background. Kulieke and Olszewski-Kubilius (1989) found that families of 1985 and 1986 Northwestern University summer program participants were predominantly middle to upper income; 64% had household incomes of over $50,000 per year. Some studies have found unusually high levels of parental education among families of gifted (e.g., Van Tassel-Baska, 1983). In general, parents of gifted children tend to have more education than parents of average children. Mothers of many gifted children, though well-educated, are primarily homemakers with their lives centered around children and family (Van Tassel-Baska, 1983).

One intriguing finding from the eminence literature is the high incidence of parental loss, especially early loss of a father, among eminent individuals (Goertzel & Goertzel, 1962; Roe, 1953; Albert, 1971). Albert (1971) speculated

that the loss may enhance early psychological maturity and less affiliation with family members which, in turn, contributes to greater creative production later in life.

Comparison. In both Taiwan and the United States, gifted children tend to come from smaller families in middle to upper class backgrounds and to have well-educated parents and full-time mothers. One interesting finding is that full-time mothers in Taiwan, even the less educated ones, contributed more to the gifted child's achievement than better educated, working mothers (Tsai, 1994). Home-making may not be a great career option, but this study suggest that the positive impact of full-time mothers on their gifted children may justify many well-educated mothers' choice to stay home.

Very little research has been conducted on the effect of parental loss on gifted children in Taiwan. Why this seemingly negative event would result in a positive outcome is still unclear. In recent years, family structures in both Taiwan and the United States have gone through drastic changes. Little attention has been paid to the effects of these structural changes (e.g., divorce, second marriages, single parenting, foster homes, or living with extended families) on gifted children's talent development. More research is needed in both countries to understand these effects fully. More research is also needed to clarify the interactions among SES, gifted families, mothers' roles, and gifted children's performance in Taiwan.

Family Values

Taiwan. Emphases on education and diligence are the most common family values in Taiwan. High parental expectations for academic performance are set for all children. Most parents expect their children to get at least a bachelor's degree, and many expect a graduate degree from abroad (Lee, 1973). School work is viewed as extremely important for the children's future. Regardless of parental education level or family socioeconomic status, academic activities always have top priority in Taiwanese families. (Tsai, 1994).

Tsai (1994) also found that both high- and low-achieving gifted children in Taiwan perceived their parents as valuing education and as having high expectations for academic performance. However, families of high-achieving gifted students seemed to preserve the Chinese traditional values of diligence, the importance of education, and respect for the teacher to a greater degree than families of low-achieving children. Parents of high achievers not only espoused these values at home by emphasizing school work and effort, but also enacted their values by selecting "good" teachers (i.e., teachers who were diligent and able to help students earn high scores on exams) and "good" schools (i.e., schools known for their academic excellence) for their children. Financing educational resources (e.g., tutors, private lessons, learning materials, and books) was considered a major and necessary part of the family budget in the families of high achievers.

Emphasis on effort is another indisputable value in Taiwan. In a study of 799 mothers from five elementary schools in Taipei, Huang (1993) found that mothers of gifted children ranked "effort" and "teaching quality" as the most important factors affecting children's learning. Ability was ranked third in importance. This finding is congruent with the traditional Chinese belief that effort is the most important factor in success. In Taiwan, giftedness cannot be used as an excuse for not working hard or as a substitute for effort. If a child is born with high potential, it is his or her responsibility to work even harder so that his or her potential will not be wasted. Successes are often taken for granted and failures seen as inexcusable for gifted children in Taiwan. Parents, as well as gifted children themselves, tend to attribute poor performances or bad grades only to lack of effort without considering other possibilities (Liu & Liu, 1990). Very few attempts have been made to investigate possible reasons for underachievement other than lack of effort.

Honoring parental choices or meeting parental expectations is also important in the Chinese tradition. Though more parents of gifted children than average children (35% vs. 5%) expressed a belief that their children should be able to make their own career decisions (Lee, 1973), parents in Taiwan still influence or control many gifted children's academic, career, and even marriage choices (Tsai, 1994). In a follow-up study of participants in a middle school gifted program, Wang (1992) found that both male and female gifted students ranked "Meeting parents' expectations" as the number one reason for choosing majors that were not their own first choices.[1] Chien and Lo (1989) reported a trend toward less parental control and more respect for children's aptitudes and academic choices over the past 20 years for all children. However, honoring parents' wishes and bringing one's performance up to parents' expectations are still objectives that are important for many gifted children in Taiwan. Children are expected to carry out family values and not their own values. Since academic achievement, particularly in the field of science, is the most common value for families in Taiwan, many gifted children are pressured to pursue academic achievement in specific scientific fields such as medicine, engineering, and natural sciences (Cheng, 1994).

Family values also affect the goals of school gifted programs. Most gifted programs in Taiwan were originally designed to develop gifted children's specific talents rather than to improve their test skills. However, under parental pres-

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[1] The choice of academic majors is not as flexible in Taiwan's education system as in the United States. Every department in every University has a "score hierarchy." A student must obtain the minimum acceptance score for that University and that department in the entrance exam to be eligible to select that department as his/her major area. Medical schools also pick students their freshman year, and only the children with the highest scores can get in. The score on the entrance exam is the only criterion for acceptance; high school grades or extracurricular performances are not counted. Recently the education reform movement in Taiwan has implemented some alternatives for talented high school students to get into university without taking the entrance exam. However, medical school entrance is still very limited and competitive.

sures, many gifted programs have had to shift their primary goals from talent development to success on entrance exams (Kuo, 1994).

The United States. Bloom (1985) studied talented American scientists, artists, and athletes and found that their parents valued doing one's best, winning, success, excellence, and task persistence. Coffey et al. (1976) and Ginsberg and Harrison (1977) also found that parents of high-IQ children modeled an appreciation of knowledge and the value of learning. These parents were also more involved in their children's learning activities. Parents of high-IQ children have been found to be more vigilant about checking homework, monitoring practice time, and communicating with teachers (Bloom, 1985; Getzels & Jackson, 1962).

In studying creative architects, MacKinnon (1965) found that their parents emphsized cultural and intellectual pursuits, success and ambition, diligence, development of talent, and joy in work. Some studies have suggested that the families of high-IQ children have different emphases from the families of highly creative children (Moon, Jurich, & Feldhusen,1998; Olszewski, Kulieke, & Buescher, 1987). For example, Robinson and Noble (1991) suggeste that independence is the predominant value for families of creative children. Getzels and Jackson (1962) found that parents of high-IQ children pressured their children for scholastic achievement more than parents of creative children.

Different ethnic groups in the United States may hold different family values. Some African-American families perceived academic success as conflicting with their community values. Researchers suspect that underachievement of some gifted African-American children may be attributed to these value systems conflicts (Ford, 1996; Rimm, 1995; Steinberg, 1996).

Comparison. High standards for educational achievement and involvement in children's learning are found in families of gifted children in Taiwan and in the United States. However, academic achievement is often the sole emphasis in Taiwanese families, whereas American families seem to value other achievements of their children as well. Tsai (1994) found that most Taiwanese parents held high expectations and high standards for academic achievement for their children, whether or not their children were gifted in academic areas. Children are encouraged to develop multiple talents when they are young but are expected to give up everything that may interfere with the preparation of entrance exams when they get older. In general, non-academic talents such as those in arts or sports are usually considered "useless" in Taiwan. Children who are gifted in these areas also need to spend most of their time studying academic subjects in order to pass the entrance exams.

Value conflicts exist both in Taiwan and in the United States. For example, some families of gifted African-American children may view academic success as threatening to their own culture and, hence, discourage further development of their children's academic talents. In Taiwan, on the other hand, many families see non-academic talent development as threatening to their gifted children's

future success in academic areas and, hence, discourage further development of their non-academic talents.

Families of gifted children in Taiwan seem to place more emphasis on effort and the fulfilment of family honors than families of gifted children in the United States. Children's poor performances are often attributed to "lack of ability" in the U.S. but to "lack of effort" in Taiwan (Huang, 1993; Stevenson, Chen, & Lee, 1993). In Taiwan, gifted children are constantly under pressure to put in more effort to meet their parents' high academic expectations. In the United States, less effort is expected for gifted children, and their parents seem to respect their children's individuality more.

Family Relationships

Taiwan. Most studies of families of gifted children in Taiwan focus on how parenting styles affect gifted children's learning styles as compared to those of average children. Wang (1992) found that, in general, parents hold positive attitudes toward their gifted children. Mothers tend to be both more caring and more controlling than fathers. Taiwanese gifted children usually perceive their parents as being fair to all children in the family (Wang, 1992). Tsai (1994) found that high-achieving gifted children, compared with low-achieving gifted children, have more stable and warm family relationships. Parents spend more time with their children and emphasize communication. More gifted children than average children categorize their parents' parenting styles as "proper" (81% vs. 52%) and fewer gifted children than average children rated their parents' styles as "poor" (9% vs. 23%) (Lee, 1973).

C. Y. Chen (1993) reported an interview with 20 outstanding inventors in Taiwan. She found that most interviewees recalled their parents' parenting styles as very "democratic" and "free." They attributed their later creativity in invention to this less controlling style of their parents. Chan (1983) compared the parenting styles of parents of artistically gifted 4th-6th graders and average 4th-6th graders. He found that artistically talented children perceived their parents as being more consistent, more accepting (loving, trusting, helpful, and valuing of the child's opinions), more indulgent, and as holding higher expectation for achievement than average children perceived their parents to be.

Sibling relationships have not been studied specifically in Taiwan. Lin (1989) found that gifted children seemed to have better relationships with their siblings than the normal group. Gifted children also did not perceive any impartial treatment for them or their siblings from their parents (Chen, J. Y., 1993). No studies have been done in assessing non-gifted siblings' perceptions of their relationships with gifted children. Research on how different components within the family system interact with each other is still rare in Taiwan.

The United States. Findings on relationships among family members in families of gifted children in the United States have not been consistent. Roe's (1953) study of eminent scientists found that social scientists had tense relation-

ships with their parents. Getzels and Jackson (1962) reported that parents of high-IQ, low-creative children were less accepting and more critical of their children than parents of high-creative, low-IQ children. The parents of high-IQ, low-creative children emphasized conformity to conventional values rather than independence and nonconformity. On the other hand, Dewing (1970) found that parents of intellectually gifted children tended to allow their children more freedom to choose friends, make decisions, and encourage creative interests and activities outside of their homes. Not only do different types of gifted children (such as intellectually and creatively gifted children) seem to have different types of family relationships, inconsistent findings have also been found within each subgroup (for reviews, see Moon, Jurich, & Feldhusen, 1998; Olszewski, Kulieke, & Buescher, 1987). For instance, creative children have been found to express lack of closeness with parents and other family members (MacKinnon, 1965); to have more intense, emotionally charged relationships with both parents and to be less dependent on family members for support (Weisbuer & Springer, 1961); and to have unusually close relationships with their mothers and cohesive families (Bloom, 1985). Families of high-IQ children have been reported to be more child-centered but less accepting than families of creative children (Albert, 1978; Bloom, 1985; Getzels & Jackson, 1962; Weisberg & Springer, 1961). One consistent finding for both high-IQ and highly creative children is that their families emphasize structure and order (Olszewski, Kulieke, & Buescher, 1987). Parental expectations and family standards for behavior are clear in both types of families of gifted children. Recent findings also suggested that families of gifted children in the United States were child-centered and had supportive and close relationships (Friedman, 1994).

Sibling relationships have been found to be problematic for some gifted children in the United States. Ballering and Koch (1984) found that gifted children had less positive relationships with gifted siblings and more negative relationships with non-gifted siblings. Other studies also reported disrupted sibling relationships (Bridges, 1973; Peterson, 1977), lower self-esteem for non-gifted siblings (Grenier, 1985), and poorer adjustment for non-gifted siblings (Cornell, 1984).

Comparison. Stable parental relationships seem to be a common characteristic for families of gifted children both in Taiwan and in the United States (Barbe, 1981; Groth, 1975; Lee, 1973; Van Tassel-Baska, 1989). Parents in Taiwan tend to be more involved in their children's academic achievement and to exercise more control over their children's choices (Chien & Lo, 1989; Lin, 1989; Tsai, 1994). Since children are viewed as the extension of the family in the Chinese tradition, more conformity and less individuality are expected. Tensions often develop when children feel their parents are demanding too much of them simply out of family honor. In recent years, parenting styles in Taiwan have become more open and democratic due to the "Westernization" in Taiwan's society (Liu & Liu, 1990). More confrontation might be expected between children and their parents in the future because of this shift from the

traditional pattern (e.g., obligation and conformity) to a more "American" pattern (e.g., freedom and originality).

Power struggles within the family structure and sibling rivalry have not been a research topic nor a problem in Taiwan. Geographically, Taiwan is a heavily populated area, and special resources for gifted children are usually readily accessible. Families do not need to move or make huge changes in order to accommodate the needs of the gifted children. This might be one reason why gifted families in Taiwan have fewer adjustment problems than those in the United States. Sibling rivalry has also received less attention in Taiwan than in the United States. Though perceptions of gifted children's siblings were not assessed, gifted children in Taiwan seem to share more positive sibling relationships with their siblings than American children. More research is needed on how giftedness affects family interaction and relationships in Taiwan.

Family Stressors

Taiwan. Families of gifted children have not been studied from a systemic perspective in Taiwan, and no Taiwanese studies have addressed how families adapt to the labeling of their children. Traditionally, Chinese parents are supposed to provide everything necessary to enhance their children's education. A child's performance, good or bad, is viewed as the extension of the family's performance. As a result, parents share pride when their children perform well and feel ashamed when their performances are not up to par. It is very hard for parents to evaluate and interpret their children's performances objectively because of the deep involvement and the inseparable feelings parents have with their children. Having a child labeled "gifted" usually brings a lot of honor for the family; however, what follows is a constant demand for outstanding performances. Parent of gifted children feel pressured to raise performance standards and "prove" their children's giftedness to others. At the same time, the Chinese are taught to be humble and never brag about their accomplishments. Parents have to devalue their children's outstanding performances or giftedness to show their humility. Many parents want what is best for their children, e.g., a better learning environment or better programs, but at the same time, they feel uncomfortable about admitting their children's giftedness by requesting special treatments. They even feel guilty about the special services their children receive because their children are already "better off" than other children. Because of these conflicting feelings, very few parents of gifted children would fight a school system and demand a more challenging environment for their children. The constant struggle between their duty, i.e., to provide the best possible learning environment for their children, and traditional teachings, i.e., to keep a low profile, can create a lot of stress for parents with gifted children in Taiwan. Lee (1988), a teacher in a self-contained classroom for the gifted, observed that parents have four different types of response to their child's labeling: the anxious, the irresponsible, the supportive, and the pushy. She reported that most of the

parents belong to the supportive type in her school but suggested that other types of parents are not uncommon.

Another source of stress comes from tension between the traditional demand for academic achievement and the development of individual talents. Chinese parents always feel obligated to make the right choices for their children or, at least, feel responsible to guide their children toward making right choices. Since academic achievement has the utmost value in Chinese culture, parents feel the need to urge their children to pursue such achievement. They often convey to their children that the sole responsibility of the child is to get good grades and high scores on all exams. The over-emphasis on academic achievement has created unique stressors for families of gifted children in Taiwan. Stress is easily built for gifted children when they are bored with endless drills and mini-tests. Many gifted programs become intensive preparation programs for entrance exams rather than places to develop talent. Family stress can multiply when children possess specific talents that do not match the exam subjects. To comply with parental expectations, many gifted children choose majors that do not satisfy them personally. The mismatch between gifted children's own interests and their parents' expectations often causes internal conflicts in these children and dissatisfaction in career development in later years (Wang, 1992).

Parents in Taiwan can also become very confused about how to guide their children and make the best choices for them. When needs for talent development conflict with preparation for exam performance, many parents would choose to suppress talent development in order to ensure success in the academic realms. The mismatch between what the child is good at (e.g., a nonacademic talent) and what parents perceive to be good for the child (e.g., to pass entrance exams to get a higher degree) causes a lot of tension for families of gifted children in Taiwan.

The United States. Research in the United States has suggested many possible sources of stress for families of gifted children (see Moon, Jurich, & Feldhusen, 1998, for a review). Ross (1979) felt that most parental stress came from the fact that they had to deal with "exceptional" children rather than "normal" children. Only a few studies have looked at the effect of the "gifted" label on children and their families. Cornell (1983) found that parents do not always agree on the accuracy of the label. Family tension seems to be most intense when the child is first labeled (Colangelo & Brower, 1987). Parents also feel confused or even guilty about not being able to provide adequate social and educational experiences for their gifted children (Colangelo & Dettman, 1983; Hackney, 1981; Keirouz, 1990). Talent development activities can be very expensive and time consuming (e.g., private lessons or summer programs). Families of gifted children may be constantly under financial pressure as well as feeling pressures to distribute family resources impartially for all family members. When children are highly gifted (IQ > 150), the situation is worse and induces even more stress for their families (Silverman & Kearney, 1989).

Asynchronous development can also create stress for families (Genshaft, Greenbaum, & Borovsky, 1995; Kearney, 1992; Moon & Hall, 1998; Webb, 1993). Discrepancies among the cognitive, social, and emotional development of gifted children can create great anxiety and concern for parents (Colangelo, 1991; Silverman, 1991). Many parents lack proper understanding of this asynchrony of gifted children's development and, hence, develop unrealistic expectations for their children in domains other than their children's specific talent areas (Sebring, 1983).

Comparison. In western countries many parents of gifted children seek consultation because they are uncertain about how to provide their child with an appropriate upbringing and insecure about their capability to support their child in a helpful way (Colangelo, 1991; Silverman, 1991; Wierczerkowski & Prado, 1991; see Moon, Jurch, & Feldhusen, 1998, for a review). In Taiwan, some parents show similar anxiety (Lee, 1988) but very few consultation agencies are available for them. Chinese parents are also very reluctant to seek personal help outside of their extended family. From the existing research findings, it is reasonable to infer that Taiwanese parents do feel worried about how to guide and support their children after their children are labeled "gifted."

However, Taiwanese parents' major concern is still their children's academic achievement. Since there are very limited educational alternatives for gifted children in Taiwan, most gifted and talented children are forced to become "test-machines" and to sacrifice opportunities to realize their potential in non-academic areas. Conflicts between parental expectations for high academic achievement and the development of children's nonacademic talents have created unique stressors for families of gifted children in Taiwan.

Many researchers in the United States (e.g., Colangelo, 1991; Kearney, 1992; Silverman, 1991) have suggested that the asynchronous individual development of gifted children can create unique stressors for their families. No research in Taiwan has looked at this phenomenon and its effect on families of gifted children.

Relationships with other systems

Taiwan. Tsai (1994) found that Taiwanese parents of high-achieving gifted children tended to select schools and teachers for their children. They were more willing to communicate and cooperate with teachers and school administrators than parents of low-achieving gifted children. Another study comparing underachieving and achieving elementary gifted children found that only teachers' positive ratings and peer acceptance in school were significantly different for these two groups (Liao, 1991). Both parents and gifted children perceived teachers as very influential in learning (Huang, 1993; Lin, 1989).

Though evidence is still scarce, gifted children in Taiwan do not seem to have problems getting along with their peers and their neighbors (Lin, 1989; Steeves, 1993). Steeves (1993) found that gifted children are no more likely to

be considered neglected or controversial than their non-gifted counterparts. Though they were not the "most liked" group, they were not assigned to the unpopular group either. In Lin's (1989) study, two-thirds of the children said that their neighbors did not have any particular response to their enrollment in a gifted class, and they did not feel any pressure from their neighbors either.

The United States. Adversarial home-school relationships and poor school programming have created concern and dissatisfaction for families of gifted children in the United States (Hackney, 1981; Kearney, 1992). When families and schools do not share the same values or appreciate the talents of gifted children the same way, stress and dissatisfaction will mount in the school, the families, and the gifted children. For example, Rimm and Lowe (1988) found that school-home relationships of gifted underachievers were likely to be oppositional and conflicting. On the other hand, Moon (1995) found that when appropriate and stimulating programming for gifted children was provided by the school, their families reported positive changes in their family system, decreased levels of conflict between home and the school, and improved family communication and cohesion. Similarly, Ford (1994) has suggested that only strong family-school-community connections can nurture resilience in talented African-American youth.

Research on relationships between gifted youth and their peers in the American literature is somewhat mixed. Relationships with peers seem to be troublesome for some gifted youth. For example, Hackney (1981) reported that gifted children often experienced teasing and/or rejection by neighborhood children. Being smart has also been found to be detrimental to popularity among American adolescents (Steinberg, 1996). As a result, some gifted adolescents have been found to seek peer acceptance by rejecting their giftedness in the school setting (Clasen & Clasen, 1995; Steinberg, 1996). On the other hand, studies comparing younger gifted children to non-identified children have found that gifted children have better social skills and are better accepted by their peers in school settings (Janos & Robinsion, 1985; Robisnon & Noble, 1991; Schneider, 1987). In addition, the Asian-American peer culture appears to be an exception to the general nonsupportiveness of academic achievement among adolescents in the United States. Asian-American teens are the only subgroup of teens that have been found to support and encourage academic achievement (Steinberg, 1996). A systemic perspective is clearly essential for studying interactions among giftedness and the home, school, peer, and cultural systems.

Comparison. Interactions between families and schools seem to affect gifted children's achievement both in Taiwan and in the United States. However, American parents seem to play a more aggressive part in determining their children's education, whereas Taiwanese parents tend to be more permissive and do not question the appropriateness of school curricula.

Relationships with neighborhoods and peers have rarely been studied in Taiwan. The one study that examined these issues (Lin, 1989) reported that two-

thirds of the gifted children in the sample said their neighbors did not have any particular response to their enrollment in a gifted class. They also did not feel any pressure from their neighbors. In Taiwan, being a "nerd" or a "brain" is positive, not negative. Most people in Taiwan have more respect toward scholarship than sportsmanship. A little rejection out of jealousy is possible, but not because of the devaluation of academic talents. Hence, as might be expected, the Taiwanese culture is much more like the Asian-American culture than the white, Hispanic, and African-American cultures in the United States with respect to attitudes toward academic achievement.

A more collective view of society suggests that different systems should have a closer relationship in Taiwan. However, the concept of viewing interactions from a systemic perspective is still rather new for researchers in Taiwan, and no studies were found that had taken such a perspective. It should be a fruitful effort to examine interactions within and among different systems in Taiwan to understand how gifted children affect their families and other systems, and how families and other systems have an impact on gifted children.

Implications for Future Research

Family research in Taiwan is still in its infancy, and many problems exist in the present research literature. In this section, we critique the existing literature by focusing on three core problems: lack of a systemic perspective, lack of appropriate research instruments and researchers, and lack of rich and complete information. In addition, we discuss the implications of our review for future research on families of gifted children in Taiwan.

Lack of systemic perspective

Only a few studies have focused on the ways families influence gifted children in Taiwan, and none have studied families with gifted children from a systemic perspective. Almost all studies looked at effects of narrow constructs and/or unidirectional relationships. For example, a few studies used questionnaires to assess parenting styles or learning styles of gifted children and average children and compare their differences. Some studies examined the effects of different family demographics, parent-child relationships, or parenting styles on gifted children's academic achievement. No study has attempted to investigate how gifted children function in the family system or how different components of the family system interact with each other, e.g., how different characteristics of gifted children affect their relationships with their parents or how parent-child interactions influence their relationships. Also, no study has tried to examine interactions between family systems and the school systems or how those interactions might affect gifted children's performances.

The effects of different family structures on gifted children have not been examined in Taiwan. As the divorce rate is rising fast, future research will need to examine how structural changes in families affect gifted children. Extended

families (e.g., families with grandparents) are still common in Taiwan. Grandparents often are the actual primary care-givers for a lot of children due to the increase of working mothers, though Tsai (1994) found that many highly achieving gifted children have full-time mothers. Research is needed to understand why a full-time mother, regardless of her education level or family SES, contributes so significantly to her child's giftedness and achievement; and how families with working mothers and enhance talent development in their children.

Lack of appropriate research instruments and researchers

Most research instruments used in studying families of gifted children have not been designed specifically for the gifted population in Taiwan. Some instruments have been developed for average children and their families, and some are translated directly form another language (usually English). These instruments may not be able to assess special characteristics of gifted children and their families in Taiwan. Efforts should be made to establish the construct validity of these instruments with Taiwanese gifted children before research findings are interpreted. In addition, researchers need to develop instruments that are specifically designed to assess Taiwanese gifted children and their families, rather than always depending on borrowed instruments developed in western cultures. Above all, we need more researchers who are willing to devote their time and energy to research on gifted children and their families.

Lack of rich and complete information

Most studies of families of gifted children in Taiwan have been done in selected metropolitan areas, such as Taipei, which have higher overall parental education, more western influences, smaller family sizes, and perhaps different family structures and values. Recruiting participants from different areas should provide a better representation of the gifted population in Taiwan.

The problem with treating "gifted" children as a homogeneous group and defining them only by group administered IQ scores has also created many confusing results. Since most gifted programs in Taiwan only recruit children who are gifted in math and the natural sciences, most studies have been conducted with families of children with this one type of talent. Very few studies have been done with highly creative children, children talented in the humanities, or children developing non-academic talents. An awareness of possible confounding variables resulting form different characteristics of the gifted children themselves is necessary in designing and interpreting research findings. Broader sampling strategies are needed to recruit children with different talents to get a more complete picture of characteristics of the gifted population.

The research on gifted children and their families in Taiwan has been narrow in focus. Studies have examined effects of a single family factor on children's school performance or have compared the family characteristics of gifted and

average children. Usually information is gathered by self-report questionnaires or interviews. Only one qualitative study has been conducted (Tsai, 1996). Longitudinal studies that follow the development of the gifted children are also rare in Taiwan. We need research that will provide not only quantitative but also qualitative information using different methodologies to enhance our understanding of gifted children, their families, schools, and their interactions.

The family is the most important system in the Chinese tradition. Yet, most current research has examined student learning or parenting styles and has not attempted to investigate the family as a functioning system. The first priority of family research in Taiwan is to use qualitative methods to identify different components that are operating in the family system and describe how Taiwanese families with gifted children are functioning from a systemic perspective. Next, we can examine how families of gifted children are similar to or different from other families and how gifted children and their families affect each other. Quantitative studies are also needed to clarify directions of influence and confirm some of the qualitative findings with a larger database. We need to incorporate different methodologies as well as research findings from different fields to help us understand gifted children and their families in different cultural contexts. Humans are complex beings who form a complex society. Even seemingly independent factors are intertwined with other factors. The systemic perspective offers a useful theoretical framework for future research on families of gifted children in different cultures.

Implications for Educators and Parents in Taiwan

Parents as well as educators in Taiwan are still focusing only on gifted children's cognitive development. The social/emotional growth of gifted children is not really a major concern for most parents in Taiwan yet. The effects of non-intellectual factors, such as social/emotional or motivational factors, on intellectual development need to be studied and revealed to parents of gifted children. The growing awareness of the "whole child" concept and the possibilities of asynchronous development in gifted children may help Taiwanese parents better understand and interpret their children's behaviors.

Parents, as well as the general public, need to understand that academic achievement is not the only path to success. Other talents are valuable and should not be sacrificed for the sake of entrance exam. Identifying talents at an earlier stage, and providing parents with guidance on how to facilitate their children's talents, could help parents understand and support their children's talent development.

In Chinese tradition, the individual is inseparable from his/her family. Family values are the individual's values. However, as lifestyles and thinking patterns have become more "Americanized" in Taiwan over the past 20 years, family structures and behavior patterns are becoming more similar to those of the United States. Parenting styles have become more "democratic" and "loving."

Children are more respected as individuals, and their differences are more tolerated. However, many parents are confused by the fast changing society, as well as the changing of values. The ways in which families in Taiwan adjust to changing values for raising their children need to be studied so that the impact of change on gifted children's development can be understood. Cross-cultural studies can help us depict similar factors, as well as different ones, in multiple cultures that affect families of gifted children in different ways.

Schools usually play a more authoritative role in the family-school relationships in Taiwan than in the United States. The Chinese tend to show high levels of respect for teachers and school administrators. Parents need to know their responsibilities, as well as their rights, in the development of their children. Schools and parents should be interdependent, not dependent on and/or independent of each other. Gifted programs should not only provide appropriate curriculum for gifted children, but also provide needed information to their families. Helping children to develop their talents should be a joint focus of all systems, and no one should be left out.

Family counseling is desperately needed in Taiwan. Because Taiwanese parents feel responsible for their children's future, they are eager to seek guidance. Unfortunately, very few institutes provide professional guidance to these parents. When a gifted child is involved, anxiety mounts. Parents feel more obligated to support their children's development but uncertain about how. Especially when parents feel that they need to guide or make correct decisions for their children, they struggle between competing values, e.g., academic achievement or the development of nonacademic talents; the Chinese tradition of conformity or Western individuality. Teachers in gifted programs usually "give" advice to parents with gifted children, and communication tends to be only unidirectional, i.e., teachers tell parents what to do. Professional counselors, especially with knowledge of gifted and talented children, their families, and their developmental needs, are needed to (a) help coordinate different systems surrounding gifted children, (b) help families function properly, and (c) help schools provide appropriate curriculum for enhancing the development of every talented child.

Conclusion

Our literature review and cross-cultural comparison suggest an immediate need for research from a systemic perspective on families of gifted children in Taiwan. The task is complex and beyond an individual effort. Researchers from different backgrounds, e.g., gifted education, counseling, family therapy, and/or developmental psychology; and with different methodological skills, e.g., quantitative, qualitative, and/or systemic, must work together to investigate the family systems of gifted children in Taiwan and discover how families can best facilitate the development of gifted children. Similar research is needed in other countries around the world in order to build a better understanding of the characteristics of families of gifted children in different cultures.

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